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# INDONESIA ICT ASSESSMENT

## USING ICT TO INCREASE THE SUCCESS OF USAID/INDONESIA'S AGRICULTURE SECTOR PROGRAMS


BGI
BUSINESS GROWTH INITIATIVE

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# INDONESIA ICT ASSESSMENT: USING ICT TO INCREASE THE SUCCESS OF USAID/INDONESIA'S AGRICULTURE SECTOR PROGRAMS

**Authored by:**
**Judy Payne (USAID)**
**Mike Ducker (J.E. Austin Associates Inc.)**

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# Table of Contents

## Acronyms

| | |
|---|---|
| AMARTA | Agribusiness Market and Support Activity |
| APJII | Asosiasi Penyelenggara Jasa Internet Indonesia |
| BI | Bank of Indonesia |
| BRI | People Bank of Indonesia |
| BRTI | Badan Regulasi Telekomunikasi Indonesia/Indonesian Telecommunication Regulatory Body |
| BTPN | PT Bank Tabungan Pensiunan Nasional Tbk |
| DAI | Development Alternatives Inc. |
| EDC | Electronic Data Capture |
| EG | Economic Growth |
| EGAT | Economic Growth and Trade |
| GEP | Global Entrepreneurship Program |
| GOI | Government of Indonesia |
| GPS | Global Positioning System |
| ICT | Information Communications Technology |
| IFC | International Finance Corporation |
| ISP | Internet Service Provider |
| ITU | International Telecommunication Union (ITU) |
| LPMAK | Lembaga Pengembangan Masyarakat Amungme Kamoro |
| MNO | Mobile Network Operator |
| NGO | Nongovernmental Organization |
| PADA | Papua Agriculture Development Alliance |
| SOW | Scope of Work |
| SUSENAS | Survei Sosial Ekonomi Nasional |
| USAID | U.S. Agency for International Development |
| USO | Universal Service Obligation |
| VSAT | Very Small Aperture Terminal |

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Lastly, the authors would like to thank the farmers, agribusinesses, mobile network operators (MNOs), donors, projects, entrepreneurs, universities, government officials and other businesses who met with the authors. Their input and honest assessments were critical for the recommendations in this research report. The list of most of the people interviewed is in Appendix A.

## Executive Summary

This document presents the results of an assessment of the potential uses of information and communication technologies (ICT) to enhance the success of USAID/Indonesia's future agriculture projects. The assessment also focuses on ways to improve access to financial services to smallholder farmers within these agriculture projects.

The assessment was conducted in December 2010 by USAID's Business Growth Initiative (BGI) project at the request of USAID/Indonesia's Economic Growth Team and was led by Judy Payne, e-Business Advisor, USAID, and Mike Ducker, J.E. Austin Associates. Richard Chen, USAID/Indonesia Program Economist, accompanied the team on many interviews and Preysilia, USAID/Indonesia Administrative Assistant, assisted the team with the farmer focus groups in Sulawesi. The USAID/Indonesia Control Officer for this assessment was Paul Deuster, Senior Economic Policy Advisor.

ICT includes the use of mobile phone networks (for voice, text, and data applications); radio and geographic information systems (and the use of global positioning systems, or GPS); broadband and lower bandwidth internet networks; digital images and video; and combinations of these technologies.

This document is based on background research on the ICT environment in Indonesia, interviews with government officials, mobile network operators (MNOs), banks, farmers, agribusinesses, donors and entrepreneurs in Jakarta, field visits to Papua, Bandung, and Sulawesi, and analysis.

Based on this work, the ICT assessment team made three key recommendations to USAID/Indonesia to improve the success of its future agriculture projects and increase access to financial services within key agriculture value chains. The first recommendation is to leverage ICT to train more farmers. Such training conducted by face-to-face trainers from USAID's AMARTA Project has already proven to increase farmers' productivity and hence incomes. The challenge is to extend the benefits of training to 10,000s more farmers. With face-to-face trainers, AMARTA has been able to reach some 25,000 farmers, but in Sulawesi alone there are some 400,000 cocoa farmers who could benefit from learning better agriculture techniques. The recommendation is to use ICT ~~-c~~hannels" (e.g., videos, radio, text or voice messages via mobile phones) to reach more farmers by designing such ICT interventions especially well to increase impact and more rigorously monitoring the actual impact on farmers' productivity and incomes from such uses of ICT.

The team's second recommendation is to use mobile money or banking approaches to make it easier and safer for large cocoa buyers to pay 10,000s of cocoa farmers. Such services, if well designed with the right financial institutions as partners, should lead to better access to formal financial services for these smallholder farmers, most of whom currently have poor or no access. The services should also enable these farmers to save more easily as their incomes increase so they can manage cash flow better across crop cycles and weather family emergencies better. The recommendation is two pronged. One prong calls for work with the Bank of Indonesia to improve and clarify the regulatory environment for mobile money/banking based on international best practices. The second prong is to attract current mobile money service providers to offer such services to smallholder farmers (a market segment that would

otherwise have little attraction to them) by having the USAID project facilitate access to the large payment flows from a few key cocoa buyers to the 10,000s of smallholder farmers from whom they buy.

The ICT assessment team's third recommendation is to provide an ICT workshop at the outset of the mission's future agriculture project to ensure that the new team benefits directly from the results of this ICT assessment; understands available technical and business models and best practices for designing and implementing sustainable and scalable ICT services; has options for selecting vendors and partners; and is aware of alternative approaches to rigorously measuring the impact of any uses of ICT on smallholder farmers' productivity and incomes.

There are opportunities for ICT entrepreneurs in the mobile application sector especially, but marketing and developing the right business model is the key to exploit them. One possible solution to incorporating ICT into the agriculture sector that USAID might consider is helping facilitate discussions between the ICT sector and agriculture sectors to come up with strategic solutions to support agriculture (this could be done in other targeted sectors USAID works in as well). Such work could start by focusing and expanding USAID/Indonesia's current iMULAI initiative (as well as the mission's planned innovation project) on more specific issues dealing with the agriculture sector, such as extension services.

Access to affordable telecommunications services is not consistent across Indonesia. In some areas, such as Java and Bali, there is sufficient competition and demand, which has led to lower prices and increased product offerings. In Eastern Indonesia, access to mobile networks is usually adequate, but access to the internet – especially broadband services – is still limited and expensive. Access to telecommunications is costly all over Eastern Indonesia because there are no undersea cables, forcing reliance on satellite access to domestic and international telecom networks, the most expensive approach globally.

Access to affordable telecommunications services is much worse in Papua where internet and mobile access is scant or non-existent beyond the few population centers; most inland areas are still dependent on satellite phones or two-way radios for basic communications.

The ICT Team did not make any recommendations to improve access to telecom services beyond some specific (and narrow) ones for Papua (See Appendix B.). The government is using its telecommunications universal service obligation (USO) to improve affordable access with a recent award to install some 2,800 VSATs (small satellite terminals for internet access) in Papua alone. The World Bank is also working with the government to improve affordable access to telecommunications services by addressing the legal and regulatory environment as well as better use of the Universal Service Obligation (USO).

## Introduction

This document summarizes the results of an ICT assessment conducted in December 2010 at the request of USAID/Indonesia's Economic Growth Team by Judy Payne, e-Business Advisor, USAID, and Mike Ducker, J.E. Austin Associates. Mike participated via the USAID-funded Business Growth Initiative Project. Richard Chen, USAID/Indonesia Program Economist, accompanied the team on many interviews and Preysilia, USAID/Indonesia Administrative Assistant, assisted the team with the farmer focus groups in Sulawesi. The USAID/Indonesia Control Officer for this assessment was Paul Deuster, Senior Economic Policy Advisor. The team also had logistical support in Jakarta and insights from Eka Ginting, an independent consultant.

ICT includes the use of mobile phone networks (for voice, text, and data applications); radio and geographic information systems (and the use of global positioning systems, or GPS); broadband and lower bandwidth internet networks; digital images and video; and combinations of these technologies.

## Objective and Key Tasks

The objective of the assessment was to determine if, and if so, what, ICT applications show promise to increase the success of USAID/Indonesia's future agriculture sector work – leveraging partnerships where possible and using sustainable and scalable approaches.

Key tasks from the scope of work included the following:

- A nationwide telecom analysis: a look at constraints and solutions to increase access and affordability, especially for rural farmers.
- Focus on access issues in Papua and Sulawesi especially.
- Focus on cocoa, coffee and horticulture value chains.
- Consider an array of ICT applications and technical and business models used elsewhere successfully.
- Look for partnerships to fund and scale priority ICT solutions.
- Assess opportunities for ICT entrepreneurs to support promising applications and related services and determine what opportunities exist to support them.

## Activities

The assessment team conducted the following activities:

- Pre-field work: reviewed over 50 documents (listed in Appendix E) for background information and context.
- Field work in Jakarta, Bandung, Papua, and Sulawesi. Appendix A lists interviewees with highlights as follows:
    - Members of the USAID /Jakarta Economic Growth Team.
    - Interviews with support from USAID/Indonesia's AMARTA Project in Papua, Sulawesi (rural areas and Makassar).

- Agencies of the Government of Indonesia (GOI):
  - Badan Regulasi Telekomunikasi Indonesia (BRTI): The Telecom Regulator
  - Bank of Indonesia (BI): The Central Bank
  - Not able to meet with USO implementer
- Farmers: Three cocoa focus groups in Sulawesi with 10-20 farmers in each group.
- Agribusinesses and lead firms:
  - Cocoa: Olam, Cargill, Armajaro (Olam and Armajaro buying stations plus Makassar distribution center; and the Jakarta country headquarters (Olam).
  - Coffee: AMARTA, PT Sarimakmur (exporter), Specialty Coffee Association of Indonesia (SCAI).
  - Horticulture: Bimandiri (A vegetable packager who works with Carrefour).
- Internet Service Providers (ISPs): Melsa, GreenLinks and APJII (ISP Association).
- Donors/NGOs: IFC, World Bank, GTZ, and the Grameen Tech Center.
- Banks: Bank Andara, Bank Muamalat, Bank Mandiri and People Bank of Indonesia (BRI).
- Telecom Firms, including MNOs: Indosat (Makassar; Mobile money unit and Commissioner), Telkom (Jakarta and Papua), Telkomsel (Papua, Makassar, CSR and T-Cash) and Axis.
- ICT industry/Other: MVCommerce, MASTEL, Nokia,), ITB (Tech Institute) and four ICT entrepreneurs, including Nu Media, VeeLabs, MV Commerce and Eka Ginting (former ICT entrepreneur).

## Context

The USAID-funded agriculture project, AMARTA, will be ending in April 2011, and the USAID/Indonesia's Economic Growth Team is interested in how ICT might be used to enhance the success of a future agriculture project it is planning. Other features of the mission's direction include the following:

- Indonesia is one of the countries selected for the U.S. government-supported program Global Entrepreneurship Program (GEP)[1].
- USAID/Indonesia is planning future economic growth/agriculture development work now with focus on priority crops (including cocoa, coffee and horticulture), building on many years of work in the agriculture sector.
- USAID/Indonesia also has projects related to innovation (iMULAI and another planned project in the Program Office), including work with entrepreneurs and ICT.

## Notes on Critical Success Elements for ICT Interventions

This section briefly highlights some critical success factors to ensure that ICT interventions in economic growth and agriculture projects are sustainable (without ongoing donor support), scalable, and actually increase the impact of the projects they support.[2] The ICT assessment

[1] More on GEP can be found at http://www.america.gov/st/business-english/2010/November/20101104165325rehpotsirhc0.8779871.html

[2] For a more detailed review, see Integrating ICT into Value Chain Development, Briefing Paper, USAID

team recommends USAID/Indonesia consider these factors before and during implementation of any ICT interventions.

***ICT is just too "cool."*** Agriculture and economic growth projects use ICT increasingly as part of their projects. Unfortunately, because of the growing popularity of ICT applications, projects fail to apply the same rigor to choosing ICT interventions as they apply to other types of interventions, such as grants, capacity building, or technical support. Among many potential interventions, project teams need to ask whether the potential ICT intervention is the most cost-effective and what impact is expected on project outcomes from the ICT intervention.

***Market research is rarely done*** up-front to determine what is valuable to the potential users of the ICT intervention. Projects need to look at what interventions have a good probability of increasing the project's impact.

***Re-inventing the wheel.*** Projects often develop an ICT intervention without understanding what is available elsewhere to speed the development process, which could increase the intervention's chances of success and reduce costs. Using a tender process for selecting able ICT services companies would help identify the right approach (e.g., what software platforms are already available? What applications could be adapted from other places?), instead of jumping directly into hiring a company to build the application.

***Using sustainable and scalable business and technical approaches.*** At the beginning, teams need to figure out business and technical approaches that will allow the ICT intervention to be sustainable (i.e. without ongoing donor subsidy) and have scale to help beneficiaries far beyond the USAID project's reach. For example, for ICT applications that help farmers, teams should be figuring out approaches that will scale to hundreds of thousands if not millions of farmers, not tens of thousands. Of course, in some cases, governments will be willing to fund or subsidize some ICT applications, such as farm extension services or even market price systems, but the same rigor in design should be applied.

## Quick Look at Candidate ICT Interventions for Agriculture

The ICT assessment team considered ICT interventions from a range of such applications typically used to enhance the success of agriculture sector development. These include the following seven types of applications. For an overview of six of these, please see the footnoted USAID briefing papers.[3]

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2009, http://www.microlinks.org/ev.php?ID=35186_201&ID2=DO_TOPIC and an overview briefing paper on ICT-enabled applications related to agriculture development http://www.microlinks.org/ev_en.php?ID=46494_201&ID2=DO_TOPIC

[3]Payne, Judy and Steve McCarthy. ~~"~~African Agriculture and ICT: An Overview." USAID Briefing Paper. November 2010. http://www.microlinks.org/ev_en.php?ID=46494_201&ID2=DO_TOPIC

Walker, Sophie. ~~"~~ICT to Enhance Warehouse Receipt Systems and Commodity Exchanges in Africa." USAID Briefing Paper. November 2010. http://www.microlinks.org/ev_en.php?ID=46495_201&ID2=DO_TOPIC

Payne, Judy and Josh Woodard. ~~"~~ICT to Enhance Farm Extension Services in Africa." November 2010. USAID Briefing Paper. http://www.microlinks.org/ev_en.php?ID=46497_201&ID2=DO_TOPIC

~~"~~Using ICT to Provide Agriculture Market Price Information in Africa." USAID Briefing Paper. November 2010. http://www.microlinks.org/ev_en.php?ID=46498_201&ID2=DO_TOPIC

Payne, Judy, Bruce Shulte, Shaun Ferris, Andrew Sergeant, and Mark Davies. ~~"~~Designing Scalable and Sustainable Market Information Services for Grain Markets in Malawi." FACET Webinar. June 17, 2010. USAID. http://www.microlinks.org/ev_en.php?ID=44931_201&ID2=DO_TOPIC

1. Leveraging ICT to train more farmers (improve farm extension services).
2. M-Financial services (mobile money, or m-money), mobile banking (m-banking)[4], indexed micro-insurance.
3. Applications to help large buyers manage thousands of small producers and their supply chains.
4. Access to affordable cell phone services for voice and SMS communications.
5. ICT-enabled warehouse receipts systems and commodity exchanges.
6. Market price information systems.
7. Applications to help farmer groups (cooperatives, associations) manage better.

The assessment team found the most promise for applications 1 and 2 above to meet the assessment's objectives.

## Key Recommendations

The ICT assessment team has three key recommendations related to increasing the success of USAID/Indonesia's future agriculture projects:

- Leveraging ICT to train more farmers (enhancing farm extension services)
- Using mobile money or mobile banking services to increase access to financial services for smallholder farmers
- Training the new agriculture project team in best practices related to using ICT to enhance project success and findings and recommendations of this assessment.

Each is described in more detail below.

The team also made some specific recommendations on ways to use ICT in Papua (see Appendix B) and how to increase ICT entrepreneurship and use entrepreneurship competitions to catalyze the use of ICT in agriculture (Section VIII). The team does not believe that USAID should focus on increasing telecom access (the World Bank is working on this) or support ICT tools dealing with supply chain management. The team does not recommend focusing on uses of ICT for large buyers (application 3 above) but describes such uses in Appendix C because the future agriculture project may find reasons for introducing such an ICT intervention.

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~~I~~CT Applications for Distribution and Supply Chain Management in Sub-Saharan African Agriculture." USAID Briefing Paper. December 2010.
http://www.microlinks.org/ev_en.php?ID=46725_201&ID2=DO_TOPIC

[4] M-financial services refer to a variety of services delivered via a mobile network, i.e., via a cell phone network.

## Leveraging ICT to Train More Farmers

### *Why Focus on Farm Extension Services?*

Farm extension services encompass the many types of training provided to farmers to increase their productivity, from face-to-face training in farmer field schools to demo plots, videos, and using posters and paper-based manuals.[5] The AMARTA project has been providing face-to-face farmer training and has demonstrated that it **raises farmers' productivity and thus incomes**. Per AMARTA's September 2010 presentation, it had trained more than 25,000 cocoa farmers in Sulawesi, and 80 percent of them increased their income after increasing their production, quality, and gaining access to a transparent market where more would be paid for increases in quality.

All three of the farmer focus groups conducted by the assessment team among cocoa farmers in Sulawesi were emphatic in their praise of the training and wanted more. Clearly, the AMARTA trainers and training curriculum worked as intended.

### *The Challenge*

The key challenge is to reach more farmers, for there are some 400,000 cocoa farmers in Sulawesi alone. Face-to-face training approaches are too costly to reach this number of farmers. The challenge is to figure out how to **leverage ICT to compliment this face-to-face training** and increase the positive impact for more farmers.

AMARTA has created a series of DVDs on cocoa farming topics. AMARTA reports distributing thousands of these DVDs, but their impact on farmer productivity has not been measured. In our focus groups, albeit a small sample of farmers, farmers reported they have ways to view the DVDs. Some reported they found them helpful, but only when viewed with a trainer.

Farmers also reported that they have radios or access to radios, but they had mixed reviews of the usefulness of the Government's radio programs. Some said they listened to them; others said they were not relevant or were boring.

### *Learning from Elsewhere: Leveraging ICT to Train Farmers*

There are many efforts around the world to leverage ICT to train more farmers, thereby increasing their productivity and incomes. The table below summarizes several of these efforts and provides links to more information on most of them. Unfortunately, few, if any, have been assessed to determine their relative impact on farmers' productivity (although there is an apparently rigorous impact assessment under way regarding Reuters Market Light). A recent briefing paper by the USAID FACET Project (which focuses on knowledge sharing related to ICT and agriculture development) also addresses the topic of using ICT to enhance farm extension services.[6]

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[5] We are using a narrower definition of farm extension services than is sometimes used. See, for example, the broader definition used (relating to a wider variety of information provided to farmers) in *Mobilizing the Potential of Rural and Agricultural Extension*, by Ian Christopolos, FAO, Rome, 2010. http://www.fao.org/docrep/012/i1444e/i1444e00.pdf

[6] See *Using ICT to Enhance Farm Extension Services in Africa* by Judy Payne (USAID) and Josh Woodard (AED), 11/2010, available at: http://www.microlinks.org/ev.php?ID=46497_201&ID2=DO_TOPIC

**Table 1: Efforts to Leverage ICT to Train Farmers**

| Technology | Example | Lessons Learned, Best Practices |
|---|---|---|
| DVDs (videos) | AMARTA (Indonesia) | DVDs produced by USAID Project; distributed by project and Government of Indonesia. Effectiveness unknown. |
| **Technology** | **Example** | **Lessons Learned, Best Practices** |
| DVDs | Digital Green (India) http://www.digitalgreen.org/ http://www.technologyreview.in/TR35/Profile.aspx?Cand=T&TRID=852 | Videos produced by village farmers on farm practices; viewed by village groups on rotating basis. Sustainability model unclear. 700 videos produced by 2010. Several donor sponsors. Has shown significant impact on farmers' productivity. |
| SMS with handset | Nokia's Ovi Life Tools (India, Indonesia, more) http://www.nokia.com/NOKIA_COM_1/Microsites/Entry_Event/phones/Nokia_Life_Tools_datasheet.pdf http://mobileactive.org/case-studies/nokia-life-tools | Provides SMS based ~~tip~~s" in agriculture (as well as education and health). Launched in Indonesia in December 2009. By December 2010, one million active Indonesian users for AG tips; 220,000 paid users, impact and use unclear. |
| Radio | Mali http://www.forbes.com/global/2002/0204/042.html Kenya (Farmer Voice Radio) http://www.farmervoice.org/; and Kenya's Mali Shambani http://www.new-ag.info/focus/focusItem.php?a=484 | Radio has been used for decades in the U.S. and elsewhere to provide agriculture extension information to farmers. Kenya's Farmer Voice Radio adds farmer listening groups and interactivity with farmers via SMS. Sometimes sponsored by input providers, large buyers; sometimes by government, NGOs. Mali Shambani is already sustainable. |
| Call center | Farmers' Helpline (with Kencall Call Center, Kenya) http://www.eastafricancsrawards.com/downloads/shortlisted/SC_%20Kencall%20Farmers%20Call%20Centre.pdf | Farmers call in to agronomists at call center. Advertised on radio. Some standard responses ~~p~~ushed" out as voicemail. Local languages. Sustainable business model unclear. So far, sponsored by Bill and Melinda Gates Foundation, GSMA (GSM Association, the global industry association for MNOs), Rockefeller Foundation. |
| SMS | Google Farmer's Friend (Uganda, more) http://www.google.co.ug/mobile/sms/#intro | Farmers can search via SMS for answers to agriculture questions. SMS replies linked with backup at Google, monitoring appropriateness of responses. Google applying its search expertise to improve quality. May hold promise to integrate with other approaches. |
| SMS | Reuter's Market Light (India) http://thomsonreuters.com/content/news_ideas/articles/financial/RML_wins_award | Provides agriculture tips plus weather, market price information to farmers in India. Business model: monthly subscription. Used now by 200,000+ farmers in 12 states in India (15,000 villages). Impact currently being assessed using rigorous approach (with control groups). |
| SMS | USAID's PROFIT Project initiated (Zambia) Evaluation Document with some examples | Among several ICT interventions, this USAID project facilitated an SMS service for agriculture tips for farmers sponsored by an input provider. The business |

| | | |
|---|---|---|
| | of questions to ask to assess use, impact: http://pdf.usaid.gov/pdf_docs/PNADN206.pdf | model has an entrepreneur who acts as an advertising agent and is responsible to get farmers to sign up for the service and to sell advertising SMSs to the input providers. Appears to be sustainable but no current information found. |
| **Technology** | **Example** | **Lessons Learned, Best Practices** |
| Mediated queries via cell phone | Grameen AppLab's Community Knowledge Workers http://www.grameenfoundation.applab.org/section/uganda-ag-apps<br><br>http://www.suite101.com/content/cell-phone-applications-help-farmers-in-uganda-a156375 | The approach provides answers to farmers' questions via a village-selected Community Knowledge Worker (CKW), who uses a high-end phone (e.g., a smart phone) to conduct queries for farmers. Service is now scaling in Uganda. CKWs also collect information from farmers for CKW clients. This ~~in~~bound" information service is key to the sustainability model, which has not been proven yet but shows promise. |

## *Recommendations: Leveraging ICT to Train Farmers*

**USAID/Jakarta has a great opportunity to lead the way among USAID projects using a multi-channel approach to deliver farmer training effectively.**

In its new agriculture project, USAID/Indonesia has an opportunity to encourage the project to design and implement a multi-channel approach (using a combination of face-to-face, DVD, radio, and SMS) to train tens of thousands of farmers in a way that is carefully designed to maximize impact on their productivity and incomes.

Any such approach will need to tap the skills and experience of experts in designing how adults can be educated (and motivated to engage) via these ICT ~~c~~hannels." The designer of such an approach will require a keen understanding of the tradeoffs among different ICT approaches as well as be able to draw upon skills related to how adults learn and marketing and advertising.[7] There is little or no shared learning on the effective use of these new channels for agriculture. One interesting example of a mobile phone application designed well for teaching adults is an application to teach English via SMS, developed and implemented by both the BBC and Nokia.[8]

Another example is the use of ~~in~~teractive radio," where educators have figured out the best approach for using radio. Interactive radio supports willing but poorly trained teachers in refugee camps and elsewhere with radio programs that have interludes for teachers to step forward and work directly with the students.[9] Other examples of adapting learning methods well to ICT channels include the approaches used to adapt to adult learning using the internet; these are used widely in developed countries where broadband internet access is widespread.

The project should tap experts to help answer questions such as:

[7] There is one promising study underway with a private sugar plantation in western Kenya that is testing the effectiveness on farmer productivity of the content and timing of SMS tips broadcast to farmers within the sugar cane crop cycle.

[8] See how the BBC is doing this in Bangladesh http://www.developingtelecoms.com/bbc-english-lessons-a-hit-with-bangladeshi-mobile-users.html

[9] See, for example, a toolkit on how to use an interactive radio approach effectively: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRREGTOPEDUCATION/EXTAFRREGTOPDISEDU/0,,contentMDK:20618845~menuPK:1568672~pagePK:34004173~piPK:34003707~theSitePK:732264,00.html

- What is the best mix of ICT channels for different types of farmers (e.g., literate, working in large groups, by crop grown), and have the farmers had face-to-face training as well?
- How can SMS messages or video, for example, be used most effectively to increase farmers' productivity? What pedagogic approaches work best?
- What business approaches may help the various channels and are also sustainable (without ongoing donor support)?
- How can impact on farmers' productivity be measured and separated by ICT channels so the project can decide which channel investments are most effective?

Any such approach will require careful up-front market (and perhaps behavioral) research and field testing to determine the user interfaces that work best in a given circumstance.

It is important as well that the project set up approaches to measure the impact on farmer productivity of the possible ICT interventions. This monitoring is critical!

### *Potential Partners Related to Recommendations*

The ICT assessment team identified the following possible partners by type. This assessment was conducted in December 2010, so any project team will need to re-assess the potential for partnerships as it starts up. Contacts for specific partners are included in Appendix A.

- **Nokia's Ovi Life Tools Team**. The Nokia lead for its Ovi Life Tools Team expressed strong interest in a partnership with a future USAID project. It has similar partnerships with other initiatives focused on specific crops. It seeks out domain experts to provide the content for its agriculture tips, and the Life Tools Team is also launching a "closed group" option where the USAID project might be able to have specific tips broadcast to say, cocoa farmers in specific regions who had had face-to-face training or who face particular agricultural problems (e.g., needing to replace trees or intensify efforts to combat the cocoa border). A separate closed group might be defined as farmers who will not receive any face-to-face training but will receive DVDs on specific topics; the Life Tools tips could then be geared to complement the "video channel" – that is, the use of videos or DVDs for training farmers.
- **Radio stations**: Radio stations sometimes step forward to broadcast programs to meet community social responsibility goals or may be able to identify possible sponsors. In Papua, the new radio station sponsored by PT Freeport is a possible sponsor.
- Sponsorship by **input providers and major buyers**.

## Mobile Money/Mobile Banking

### *Why Consider Mobile Banking or Mobile Money?*

The USAID/Jakarta Economic Growth (EG) team directed the ICT assessment team to review the potential of mobile banking and mobile money services as part of its future agriculture programs. These programs will have two key objectives:

- To increase incomes in the target agriculture sectors (namely, coffee, cocoa, and selected horticulture crops) and
- To strengthen access to agriculture credit for the agribusiness sector, including smallholder farmers.

Access to financial services is a significant problem for Indonesia's rural poor. Despite multiple banks, both government-owned and private, that focus on serving the ~~"b~~base of the pyramid," the majority of rural households in Indonesia still do not have access to formal financial services.[10] Mobile money and mobile banking services have the potential to contribute to both objectives, but they will most likely not dramatically increase incomes of smallholder farmers. Based on experience elsewhere, mobile banking and mobile money can indeed help smallholder farmers – and the rural poor generally – by:

- Making financial transactions cheaper (e.g., reducing fees for international and domestic remittances), safer, and more convenient.
- Making it easier to save by first saving small amounts in mobile ~~"w~~wallets" (m-wallets) for emergencies and eventually reducing dependency on collectors for working capital loans (hence allowing farmers to sell to buyers who will pay more for quality).
- Eventually opening access to a range of formal financial service products – hence helping these smallholder farmers become ~~"b~~banked."

It is important to note that focusing on mobile banking and mobile money is not likely the most effective way to increase smallholder farmers' incomes. Any USAID agriculture project can probably do this faster by investing in training (farm extension services) that leads to increases in productivity and establishing market linkages to buyers who pay more for quality. The team will not provide a primer on mobile banking and mobile money, for there are numerous well-written references[11] and the topic is dynamic. This assessment points out just a few facts about mobile banking and mobile money services relevant for this report's findings and recommendations.

The term ~~"m~~mobile banking," or m-banking, refers to using a cell phone for banking services for bank account holders. Money can usually be transferred between accounts, used to pay bills, and sometimes be transferred to a ~~"c~~cash out" point, but those using the service must have a

[10] See Microfinance Industry Report: Indonesia, 2009, by The Banking with the Poor Network in collaboration with the SEEP Network, page 8, http://www.microfinancegateway.org/gm/document-1.9.36444/MF_Industry_Report_Indonesia.pdf. Also the IFC's *Mobile Banking in Indonesia* report listed in Appendix E estimates that only 50-60 million of Indonesia's population of 250 million have bank accounts with access being worse in rural areas.

[11] For a brief overview, see *Using Mobile Money, Mobile Money to Enhance Agriculture in Africa*, a briefing paper with a useful reference list available from Judy Payne, USAID, jpayne@usaid.gov and which will soon be available via this website: http://www.microlinks.org/ev_en.php?ID=43539_201&ID2=DO_TOPIC Also see www.cgap.org

bank account, limiting the service to bank account holders. Sometimes such m-banking services allow bank account holders to transfer money to non-bank account holders, but these non-bank account holders must usually go to a bank service outlet to receive the cash transfer.

~~"M~~obile money," or m-money, services usually refer to services offered via mobile phones where neither the sender nor the receiver of a cash transfer or payment needs to have a bank account. In this case, any cash in ~~"m~~obile wallets," or m-wallets, is backed by a trust account, while a mobile network operator (MNO) or third-party service provider keeps track of the balances in individual m-wallets.

- Mobile banking is just one form of ~~"b~~ranchless banking," which includes a range of approaches banks and other financial institutions use to reduce transaction costs and extend services further into rural areas. Several other branchless banking approaches take advantage of technology (e.g., ATMs, Electronic Data Capture (EDC) terminals[12] either mobile or in merchant or bank service locations, sub-branch service units).
- Given that so many of the poor are ~~"u~~nbanked" (according to the IFC less 20 percent of the population receives financial services)[13], an m-money service is likely to be more appealing and non-bank agents more convenient, for the latter can be small stores or even mobile merchants. Fortunately, m-money services can be integrated with financial services, providing a transition for the poor from m-money to m-banking. (See, for example, the experience in Kenya with M-KESHO, a banking service from Equity Bank that is now integrated with the popular M-PESA mobile money service[14].)
- Any m-banking or m-money service is subject to the regulatory oversight of a country's central bank. There are numerous precedents for prudent approaches by regulators for overseeing mobile money and mobile banking services and ensuring that anti-money laundering and ~~"k~~now your customer" requirements are met.
- Launching an m-money service requires significant up-front investment by financial institutions, MNOs, or a combination of them. One critical element for success is establishing a convenient and large network of ~~"c~~ash in/cash out" agents, usually reaching far beyond traditional banking outlets. These agents need to manage cash liquidity carefully, are subject to rules set by the central bank and are often parts of ~~"ti~~ered" organizations, helping the organization to manage cash.
- An m-money/m-banking service may be MNO-led, bank-led, third party-led, or a combination of these. Given an MNO's core business of large volumes of small transactions and customer base, a model involving an MNO as a committed partner is likely to have an advantage for going to scale fastest.
- Most m-money services are not interoperable across MNOs (although this would be ideal) because MNOs use such services to increase their customer base and, importantly, reduce churn (customers hopping from one network to another just by changing SIM cards).
- Given the great number of mobile money services launched and operational in the past few years, there are several proven platforms (software applications) available to use with solid approaches to security and reliability. Even if a service is described as SMS-

[12] An EDC (electronic Data Capture) system includes EDC terminals which can be used by banks or merchants to scan a client's bank card and establish identity. They usually have access to telecommunications services via, for example, via an MNO, and usually have a small printer for printing a receipt. These are similar to POS (point of sale) devices.

[13] The comprehensive report on mobile money done by the IFC can be found at http://www.ifc.org/ifcext/eastasia.nsf/AttachmentsByTitle/Mobile_banking_report/$FILE/Mobile+Banking+Final+Report.pdf

[14] More on M-Kesho is at http://mmublog.org/africa-east/m-kesho-in-kenya/

based, security codes are never ~~in~~ the clear" for others to see if they view a person's SMS messages.

### *The Good News: Mobile Banking and Mobile Money in Indonesia*

The ICT assessment team made the following positive findings:

- As is well-documented in the recent IFC report, many banks in Indonesia have launched their own m-banking services recently, typically to provide a convenient new channel for their existing customers.
- A few MNOs (notably both Telkomsel and Indosat) have also launched m-money services.
- The Bank of Indonesia (BI) has made progress on regulations related to m-banking and m-money and is open to improving and clarifying them as part of a planned financial inclusion initiative in 2011. In an interview with the ICT assessment team, BI representatives expressed willingness to collaborate with USAID (or a USAID project) on these efforts.
- BI also has a mobile banking task force in place already (with bank and MNO members) and welcomed USAID (or USAID project) participation.
- Of the MNOs, Telkomsel appears the most serious about scaling its mobile money service (T-CASH), given it has hired an experienced manager from the Philippines (see interviewee list). (Although Indosat (Dompet Pulsa) may be as committed to scaling its service, its technology is network-independent while T-CASH can only be used on Telkomsel network). Telkomsel reported a significant increase in usage in the past year with approximately 4,500 agents (merchants), 3.2 million subscribers and 25,000 transactions per month), although its marketing of the service was not obvious. It reported that it began person-to-person cash transfers in October 2010.
- The IFC has funded research on m-banking in Indonesia and is now funding a pilot project in Bali with the MNO, Axis, and Bank Sinar Harapan, which is a subsidiary of the Bank Mandiri, one of Indonesia's biggest banks.
- The technical platforms being used by Indonesian m-banking services are generally selected from those proven reliable elsewhere. (Notably, Telkomsel has begun its service with a platform developed internally and is now in the process of selecting a platform from an external vendor that can handle the scale it anticipates.)
- PERBARINDO (Persatuan Bank Perkreditan Rakyat Indonesia, Indonesia's rural banking association) has a mobile banking platform from MVCommerce (with ties to the Philippines) that is proven and works across MNOs. It has been supported by GTZ in the past, but business model and marketing rollout are unknown.
- Bank Andara appears to have a solid strategy and is starting to roll out its technical services to rural banks and micro-finance institutions to enable them to offer m-banking services. Bank Andara's strategy will enable these rural financial institutions to take advantage of ICT-enabled branchless banking approaches without having to either invest in or implement a core banking system, both difficult tasks. It will also enable these rural financial institutions to conduct financial transfers electronically with other Indonesian banks via Bank Andara's access to the country's payment switch for fully regulated banks. Bank Andara has an m-money application and hardware that rural banks, micro-finance institutions, and possibly other rural retailers could take advantage of.
- Key buyers in the cocoa value chain (i.e., Olam's Makassar office) expressed strong interest in using m-money/m-banking services to help make payments to thousands of smallholder farmers three times annually via its five buying stations). Other buyers may

also find these services attractive to reduce the challenges and risks of handling so many cash payments. (Olam reported that it has to move USD 15 million cash monthly to farmers in Sulawesi alone.) Both Telkomsel and Indosat expressed serious interest in partnering with a USAID project if that project could help consolidate a demand for cash payments from a large buyer to thousands of farmers.

- The ICT team heard mixed feedback about BRI (a government bank) that has the largest outreach to the rural areas, with over 6,400 service outlets of various types in late 2010 (although none of the farmers in focus groups were using BRI). The ICT team interviewed BRI, which showed willingness to partner with a USAID project focused on bringing banking services to smallholder farmers using ICT (including m-banking). However, several organizations interviewed expressed frustration regarding the inflexibility of working with this bank in the past.
- Other banks may also be interested, such as Bank BTPN, which is already using information technology to deliver some services to clients. The bank now claims to have over 1,000 branches/outlets all over the country, ranging from Sumatra to Papua, but the ICT assessment team was unable to confirm this.

### *The Not-So-Good News: Mobile Banking and Mobile Money in Indonesia*

- No offeror of mobile money services has been aggressively marketing and pressing to increase the scale its service.
- In the case of MNO efforts at mobile money, no MNO appears to be seriously tackling setting up a large cash-in/cash-out agent network. Telkomsel has about 4,800 agents, but this is far from enough for scaling of the service.
- Per a telecom industry expert, some key MNOs still make more money on other services, so major investments needed to scale mobile money services might not generate the greatest returns.
- Bank of Indonesia's lack of clarity regarding the use of non-bank agents and expeditious (and prudent) registration requirements for agents and mobile money users contributes to the slow rollouts.
- The IFC's pilot in Bali is small – more a demonstration than a service that will go to scale and be profitable. (This is a partnership between Bank Sinar Harapan Bali and AXIS, an MNO).
- Bank Andara is just starting (and the bank itself is only 18 months old) with limited capacity for marketing and implementation as a potential USAID project partner.
- Indosat reported only about 80,000 to 90,000 users after launching its m-money service and no non-bank agents. (It relies on using branch outlets of Damanon Bank.)
- PERBARINDO's approach to mobile banking relies on rural banks to market it, and this is not strength of such banks generally.
- The key to success of any m-money or m-banking service is a large and capable network of cash-in and cash-out points, both non-bank agents and bank service points convenient to the target smallholder farmers. The team saw no significant efforts to establish such a network.

### *Learning from Elsewhere: Leveraging ICT to Train Farmers*

M-money and m-banking services are currently being introduced and scaled in several developing countries. The following table provides a brief summary of a few of them, illustrating the different approaches used (e.g., MNO-led, bank-led, third party-led, a combination, or by tapping demand in an agriculture value chain). Turn to the previously cited references on such

services for more details on key challenges, lessons learned, and best practices.[15] The services in the Philippines, Brazil, and Kenya have scaled the most dramatically, but services elsewhere appear to be approaching break-even points.

**Table 2: M-Money and M-Banking Service Examples**

| Example | Lessons Learned, Best Practices |
|---|---|
| Safaricom's M-PESA service (DFID provided some up-front funding) (Kenya) | **MNO-led service** has dramatically scaled. Within a year of launch, there were far more M-PESA users than bank account holders in Kenya. The MNO led with a strong marketing campaign for domestic remittances (~~"S~~end Money Home"). The service is now integrated with m-Kesho, a savings account from Equity Bank with no up-front fee and no monthly fees. By November 2010, M-PESA had 13.5 million customers with over 21,000 agents.[16] |
| G-Cash (USAID/MABS Project) (Philippines) | **Hybrid of Bank-Led and MNO-led model** (rural banks) given MNOs strong involvement from the outset. Rival MNO has competing (not interoperable) service, SMART Money. This was one of the pioneer mobile banking services, helping to develop key regulatory responses that others have built upon. USAID/MABS' support was critical to provide assistance to the central bank. |
| Mobile Money (USAID/ Zambia PROFIT Project) (Zambia) | Third party service provider-led service starting with **demand from an agriculture value chain** to spur rollout. After starting in a value chain, the service spread across Zambia. |
| Haiti (with partnership between USAID/Haiti with Bill and Melinda Gates Foundation) | Partnership between USAID and the Bill and Melinda Gates Foundation was established to provide competition for significant cash awards (with ~~"o~~n-demand" grants for relevant technical assistance) to provide incentives for rapid introduction and scaling of mobile banking or mobile money services for poor Haitians. The initiative is part of USAID/Haiti's HIFIVE Project, focused on financial inclusion. |

### *Recommendations: Mobile Banking and Mobile Money*

The goal for these recommendations is to use either m-money or m-banking services to increase access to relevant financial services for smallholder farmers in the cocoa sector (or perhaps other sectors if demand is significant). The impact for farmers will be the following:

- Improvements to financial inclusion for these farmers. (They will use more formal financial services.)
- Increases in income attributed to saving from reduced transaction costs.
- Possible increases in income resulting from not having to rely on collectors for personal and business credit, which allows farmers to sell to buyers who pay more for quality, rather than collectors who do not (but are currently a key source of working capital for such farmers).

The recommended approach for a future USAID agriculture project is two-pronged as follows.

[15] As previously cited, see *Using Mobile Money, Mobile Money to Enhance Agriculture in Africa*, a briefing paper with a useful reference list available from Judy Payne, USAID, jpayne@usaid.gov and which will soon be available via this website: http://www.microlinks.org/ev_en.php?ID=43539_201&ID2=DO_TOPIC Also see www.cgap.org

[16] —M-PESA Upgrade to Take Place this Weekend, Safaricom Assures Subscribers on Outage." Press Release. November 2010. http://www.safaricom.co.ke/index.php?id=1141

**1) Improvements to the regulatory environment:** The project will provide expert technical assistance and advice to the Bank of Indonesia in its efforts to clarify and enhance its regulations governing the prudent use of m-banking and m-money services based on international best practices. This assistance will be provided in the context of the BI's financial inclusion initiative (not yet defined) and, as appropriate, participation in the BI's m-money/m-banking task force.

**2) Spurring use of m-banking/m-money services by smallholder farmers** resulting in benefits described above (and measuring such benefits). Key elements of this approach include:

- Leverage large payment flows from key buyers (e.g., Olam) to thousands (maybe tens of thousands) of smallholder cocoa farmers (or also coffee or horticulture farmers if it makes sense).
- As USAID project's probable contribution to a partnership, conduct market research to help determine where target smallholder farmers spend cash so potential mobile money agents can be identified; facilitate agent network creation; help coordinate with major lead firms and their farmers in developing a plan of action to implement use of m-money. (Actual USAID-funded tasks in any partnership will of course be defined with the specific partner.)
- Approach may involve a combination of MNO and financial institution participation.
- Focus on reasonable geographic area (e.g., Sulawesi) where demand is substantial and serious challenges are not overwhelming (e.g., not Papua).

### *Potential Partners Related to Recommendation*

The ICT assessment team identified the following potential partners:

- **Telkomsel or Indosat**. Both MNOs expressed interest in partnering with a USAID project in a way similar to what is outlined above. The best approach for the project might be to define criteria for the best partnership and determine which MNO is the best fit via some form of competition or negotiation process.
- **Bank Andara** may be a potential partner for enabling rural financial institutions depending on timing, its ability to develop a network in Sulawesi, and its ability to focus on such a role. It expressed interest in such a partnership to the ICT assessment team. One possibility is that Bank Andara could be part of a solution with an MNO as well – with the MNO linking into Bank Andara's *Andara-Link* electronic network.
- **BRI** expressed interest in partnering as well, offering its financial services via a mobile banking approach with its 6,400 service centers as possible cash-in/cash-out locations. Their track record in working with development partners has been poor. It is also not clear if the bank would be willing to offer its services as well via non-bank agents or prefers only a bank-centric approach, as most farmers are not BRI clients.
- **Bank Tabungan Pensiunan Nasional Tbk (BTPN)** does not use mobile banking at present; their view is that their core clientele, pensioners, prefer to do their banking in person. The bank is quite oriented towards branch-based activities, such as providing health care information and health screening to their clients. BTPN has some 1,000 branches throughout Indonesia, including Sulawesi and Papua. It is using sophisticated technology, chip cards and EDC readers, with identification through a thumbprint for their clients, many of whom are illiterate. The bank does use mobile EDC readers, which communicate with the bank through GPRS. All of its branches are fully online.
- **Other banks or bank groups** may be interested,

- **Ruma**,[17] a social enterprise with partial funding from Grameen Technology Center, may be a potential partner for setting up and operating a rural network of mobile money agents, leveraging its current network of some 4,000 rural agents selling airtime electronically to some 400,000 customers. (See Appendix A for contact information) Ruma intends to introduce a franchise model for such agents and expand the mobile application services they offer; its strategy is consistent with a mobile money agent network.

## Training the New Agriculture Team to Use ICT to Increase Impact

To ensure that the new Agriculture Project team builds on the assessment team's analysis, findings and recommendations, leverages ICT well to increase the project's success and builds on best practices elsewhere, the assessment team recommends that the new project team have concrete training as it begins its project planning and implementation. The training workshop should cover the following topics:

- A summary of the ICT assessment.
- Advice related to the specific ICT applications recommended by the ICT assessment team.
- Information on technical and business models and best practices related to the scalability and sustainability of key ICT-enabled applications that may be useful to the team.
- Key features of up-front market research and design for impact.
- Approaches to measuring impact of ICT interventions.
- Options for technology platforms on which to build key ICT applications.
- Options for processes to use to select vendors and partners.
- Suggested criteria for competitions.

The training could be conducted by Judy Payne or someone with equivalent experience related to the uses of ICT in agriculture development and with the work of this ICT assessment team.

[17] See http://www.ruma.co.id/

## ICT and Entrepreneurship Development

Indonesia is the second country selected for the US Government's Global Entrepreneurship Program (GEP), and USAID/Indonesia is working on innovation programming across its portfolio. To aid in this programming, the ICT assessment team was asked to look at constraints and opportunities for ICT and entrepreneurship. In doing so, the ICT team conducted a very quick analysis on ICT and entrepreneurship by meeting with two universities (one with an incubator), two ICT consultants, and four ICT entrepreneurs.

J.E. Austin Associates has done several assessments and initiatives on entrepreneurship, including recently doing an entrepreneurship assessment in Egypt and doing a video presentation for BGI[18]. When looking at entrepreneurship, it is important to look at the following factors: entrepreneur mindset, market opportunities, access to capital, access to skills, and the entrepreneurship eco-system. The team gained a high level understanding of these topics and recommends enhancement of current initiatives and/or to be considered for the new agriculture project. These recommendations include encouraging the agriculture project to facilitate between the ICT sector and agriculture sector and enhancing the impact of the iMULAI business plan competitions to focus on **specific** market opportunities and increase its partner base.

### *What does entrepreneurship mean?*

From an economic growth perspective, more and more policy makers and development programs are focused on growth entrepreneurs, which are entrepreneurs who traditionally grow at 20 percent or more a year because they are focusing on product development, new markets, new processes, and/or utilization of new technologies. These are dynamic people who will generally help a country find these new growth industries, which has shown to generate a great deal of the job growth in a country[19].

## Quick look at ICT Entrepreneurship in Indonesia

An entrepreneurial mindset is when a dynamic individual identifies and develops an enterprise around opportunities created by changes in the market, environment, or technology. Unfortunately, many young people, especially in rural Indonesia do not have this dynamism and would rather work for a multi-national corporation (MNC), bank, or government agency than be an entrepreneur. One professor at Universitas Hasanuddin (UNHAS) informed the team he conducted an informal survey in his engineering class and found that only five percent of his students desired to be an entrepreneur in the future. Compare this to 21 percent of non-entrepreneur adults who have desires to be entrepreneurs, according to a survey done in 22 efficiency driven economies in which the 2009 Global Entrepreneurship Monitor (GEM) has reported[20]. (Indonesia is in transition to be considered an efficiency driven economy.)

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[18] More on J.E. Austin Associates, Inc.'s work on entrepreneurship can be found at
http://jeaustin.com/experience/technical-areas/entrepreneurshipinnovation/
http://www.youtube.com/user/EntrepreneurVoices
http://pdf.usaid.gov/pdf_docs/PNADI564.pdf
Ducker, Mike. –Where are All the Egyptian Entrepreneurs?" TAPRII Final Report. USAID.

[19] A great resource on this can be found at Entrepreneurship in the Netherlands, Innovative entrepreneurship. New policy challenges!' Ministry of Economic Affairs and EIM, February 2002 < http://www.ondernemerschap.nl/pdf-ez/A200112.pdf> which does a great job in referencing past research on the subject.

[20] Indonesia has not participated in a GEM repot, but more can be found on GEM at this web-site

From the limited meetings generated with entrepreneurs, those who do want to become ICT entrepreneurs are focusing on copying other ICT products and few have unique solutions desired by the Indonesia market which is critical according to management gurus like Peter Drucker. Indonesian ICT entrepreneurs also have a difficult time developing business models that create buzz and generate revenues. The team talked to two ICT entrepreneurs and found that in some cases they are giving away their technology without understanding how they are going to make money on it. Access to markets is the most critical to the success of any entrepreneur. Markets give entrepreneurs ideas, customers, and revenue. For most IT entrepreneurs, the market is usually focused on business and government. But according to The Global Economic Forum Technology Report[21] (see Figure 6 below), Indonesia ranks last in the region for use of ICT by governments and business. The Technology Index surveys business leaders on several sub indexes, in measuring ICT readiness, one of those sub indexes it focuses on is usage by individuals, government and business. Indonesia ranks 86th in the world on government usage in ICT and 47th on business usage of ICT, which is far from ICT-savvy countries like South Korea and Singapore, which rank first and second on government usage globally and fifth and ninth in business usage globally. Indonesia also ranks poorer than other less traditional ICT countries like Vietnam, Philippines, and Thailand. This was confirmed by a limited number of interviews conducted with ICT entrepreneurs, in which small entrepreneurs were frustrated in that many larger businesses do not outsource their ICT function and instead would hire internal ICT staff to ~~k~~keep control" of their business.

> *"Innovation…can be defined in demand terms rather than in supply terms that is, as changing the value and satisfaction obtained from resources by consumers"*
>
> Peter Drucker, *Innovation and Entrepreneurship* (New York: Harper, 1975) [orig. pub. 1986], pp. 33

**Table 3: Global Economic Forum Technology Report 2009 – 2010, ICT Usage**

| Country | Business Use Rank | Government Use Rank |
|---|---|---|
| South Korea | 5 | 1 |
| Singapore | 9 | 2 |
| Malaysia | 22 | 12 |
| Thailand | 33 | 60 |
| Philippines | 35 | 85 |
| Vietnam | 46 | 68 |
| Indonesia | 47 | 86 |

### *The bright spot for entrepreneurs in the market comes from mobile applications.*

Indonesia is one of the fastest growing markets using mobile internet, especially in urban areas. Indonesia has the third most Facebook users and the fifth most Twitter users globally, all driven

http://www.gemconsortium.org/about.aspx?page=pub_gem_global_reports

[21] More on report and rankings can be found at http://www3.weforum.org/docs/WEF_GITR_Report_2010.pdf

by mobile internet services.[22] According to professional bloggers and Indonesian telecom followers, sales of Blackberry devices grew by 500 percent in 2009[23]. Surprisingly, Indonesians pay attention to mobile advertisers; Indonesia is the third highest ranked country in the world in May 2010 on ad requests on the mobile phone according to admob[24]. Although the people viewing these ads are urban and young accessing the web through their mobile phones, it could be useful to motivate some of these firms (The assessment team did not talk to mobile advertisers) to look at SMS advertising into the rural areas. There are two organizations that the team interviewed that are supporting mobile entrepreneurs, including the Institute of Technology Bandung incubator, which focuses on creative industries and hosts a monthly event for mobile application developers called Mobile Monday.

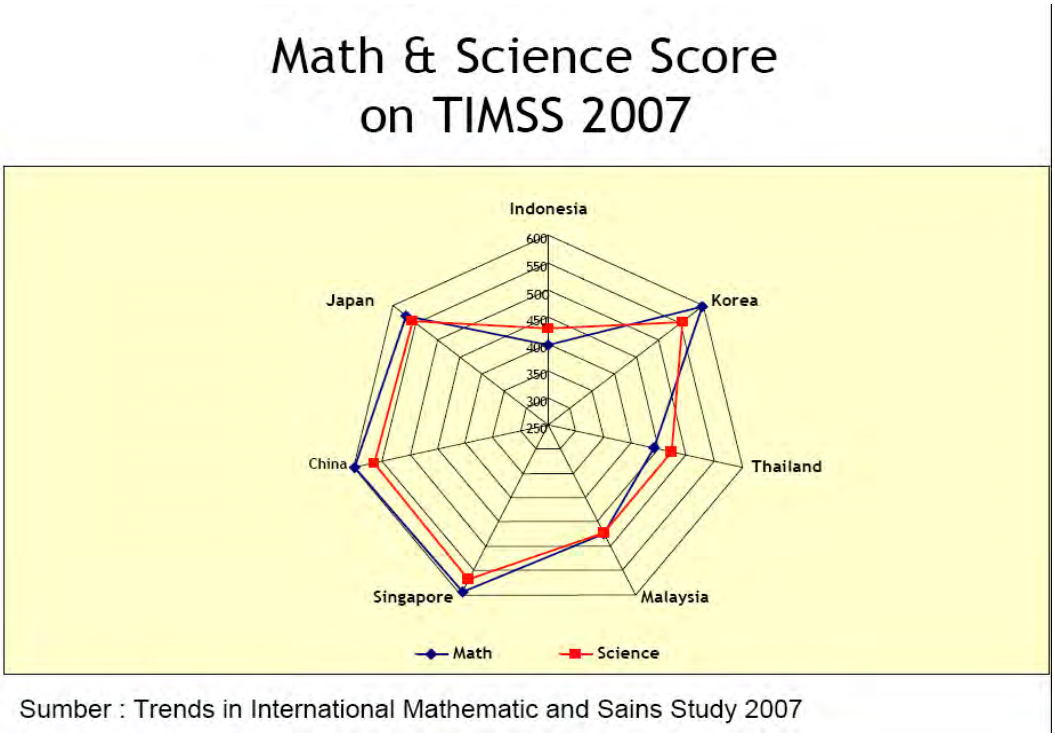
Access to finance is always a major issue for entrepreneurs, including access to growth capital, such as venture capital, and access to working capital that can come from bank financing. According to interviews, most ICT entrepreneurs in Indonesia are getting only informal financing from friends, families, and informal angel investors. It should be mentioned that these are not sophisticated angel investors like in the U.S.; they are providing small amounts of financing to entrepreneurs. The venture capital sector is nascent, and banking products for ICT entrepreneurs are almost non-existent. The handful of ICT entrepreneurship deals done during the internet boom late 1999 and 2000 – including astaga.com, detik.com, indo.com and indoexchange.com – were financed by foreign venture capitalists. There are limited exit options for these venture deals; the Jakarta Stock Exchange is not active with IT firms being traded.

Getting the right technical training and entrepreneurship training can ensure ICT entrepreneurs and their employees have the right technical and business skills to succeed. For Indonesia, there is opportunity for improvement in both cases. To have a strong ICT workforce, a country must provide strong math and science education in primary and secondary schools. However, according to the OECD, Indonesian students rank the lowest compared to their neighbors, including Thailand and Malaysia (see Figure 7 below). The good news is that Indonesia does have a handful of good engineering/IT schools and has five universities ranked in the top 100 and two in the top 50 for QS's (QS is a higher education media and research firm) top IT and Engineering for Asian Universities[25]. According to the interviews the few top ICT top engineers usually move overseas to Singapore or Malaysia, work for Multi-national Corporation (MNCs) or banks in Indonesia.

Entrepreneurship education is improving. Dynamic universities like ITB are bringing entrepreneurs to teach courses to provide students the understanding of real life entrepreneurial experience. However, there are courses, such as those taught at the Universitas Hasanuddin (UNHAS) in Makassar, that are taught more as an academic subject. This type of course does not give students the background and real life experience they need to understand how to be an entrepreneur.

[22] Bakrie, Anindya N. ~~–~~Securing Benefits of Broadband Economy." Indonesian Chamber of Commerce and Industry
[23] More of this can be found at http://www.slideshare.net/natjioe/blackberry-in-indonesia-4581342
[24] More on admob please go http://metrics.admob.com/2010/06/may-2010-mobile-metrics-report/
[25] A complete list of the ranking can be found here http://www.topuniversities.com/university-rankings/asian-university-rankings/it-engineering

**Figure 1: Math and Science Score on TIMSS 2007**




Sumber : Trends in International Mathematic and Sains Study 2007

The entrepreneurship eco-system is important for entrepreneurs and covers the business environment and support provided by outside parties, such as local governments and business associations. The team did not look deeply into the eco-system for entrepreneurs but found several interesting facts. None of the interviewees said that regulation or government bureaucracy were the major constraints for entrepreneurship. However, it was mentioned that many of the regulatory constraints are at the local level. One ISP commented that it must go through six steps with the local government before it can apply for a business license. There seem to be several organizations that are supporting ICT entrepreneurs, like KADIN (Indonesian Chamber of Commerce), MASTEL, and ITB. But given the size of Indonesia, there seems to be little local support for ICT entrepreneurs based outside of Java.

## Leverage Lessons from Elsewhere: Growing ICT Entrepreneurs

First, a word of warning: both donors and governments have attempted to develop ICT and entrepreneurship with mixed results, according to research the ICT assessment team developed for the Business Growth Initiative.[26] But some lessons from other projects are in the table below; they include facilitating between the ICT sector and other sectors and utilizing business-to-business events to educate and market on ICT solutions.

[26]More on lessons from interviews of 19 projects focus on ICT development as a targeted sector http://pdf.usaid.gov/pdf_docs/PNADL714.pdf

**Table 4: Lessons Learned from ICT Projects**

| Example | Lessons Learned, Best Practices |
|---|---|
| USAID/Egypt ICT Entrepreneurship Project | Facilitate financing between Egyptian bankers, private equity and angel investors with ICT entrepreneurs, key to hire Egyptian financers from the industry. |
| USAID/Armenia CAPS Projects | Development of ICT white papers with ICT entrepreneurs to help find ICT solutions for specific industries (tourism and pharmaceutical) and utilizing B-to-B events to bring sectors together. Major increases in domestic ICT market after initiatives. |
| USAID/Macedonia (MCA) | Use of workforce to develop new animation entrepreneurs, according to project generated 100 employees (one entrepreneur did work on the movie *The Aviator*). |
| USAID/Vietnam VNCI & USAID/Egypt While in Egypt Stay Connected | Facilitate meetings and events between ICT entrepreneurs and tourism sector, which lead to increased sales of ICT products in the ICT sector. |
| Israel | Government funded, privately run investment for entrepreneurs. Also government has policy to buy from entrepreneurs (e.g., R&D for security technology). Israel currently is an entrepreneur hub and has the most listed firms on NASDAQ outside North America. |

## Recommendations for ICT and Entrepreneurship

### *Facilitating collaboration with ICT entrepreneurs and other targeted sectors*

Based on the previous experience, USAID projects have had some success in facilitating between the ICT sector and other targeted sectors that focus on the strategic need of that industry. The best way to do this is to utilize workshops and business-to-business events to educate and market these ICT services to the targeted sector. In these workshops, the ICT and targeted sectors could share ideas, discuss specific ICT solutions, and describe the strategic utility of new technologies. The workshop with the ICT industry will focus on helping these entrepreneurs to understand the targeted sector, their issues and business language they use. The workshop for the targeted sector focuses on strategic reasons they need technology and case study on organizations in their sector utilizing the technology. USAID can then facilitate

between the two sectors, using existing events like the ICT-Indo[27] event, held every May. The key is to have a special event within the larger event and to prepare both sectors through pre-workshops and trainings.

It is not always known what technology might be needed in a certain sector to make it more competitive. Projects previously have helped to organize a white paper team to discuss various technologies that might be useful. These teams are comprised of ICT entrepreneurs who want to enter into new markets. It is important to have a facilitator on the team who knows a broad range of technologies used for business and to organize at least three interviews with different organizations in the sector. The facilitator and the entrepreneurs should find some key strategic areas where technology is needed and then work with the ICT entrepreneurs in developing a white paper team to educate and market the technology to the targeted sector. The program office new innovation project might be interested in using facilitation to get technology used in different sectors of society. Lastly, sometimes there might not be entrepreneurs who have the technologies that are needed for the targeted sectors. In that case, hosting a focused innovation competition can encourage innovation to develop the appropriate technology.

### *Focus and Expand Partnerships for iMULAI*

Business plan competitions can be a great way to help young entrepreneurs develop more entrepreneurial thinking. However, sometimes these competitions can be too much of an academic exercise. Too often these potential entrepreneurs focus too much time on the business plan competitions and not enough on developing their market (see box below on two entrepreneurs' experts' opinions on business plan competitions). There is a need to focus competitions toward specific, identifiable problems and emphasize actions and results. Examples of these types of competitions are the X Prize,[28] which supports commercial space flights, and the Netflix prize,[29] which focuses on using innovators to develop a better movie search algorithm.

[27] More on ICT Indo can be found here http://www.ictindonesia.com/
[28] More on the X prize can be found at http://www.xprize.org/
[29] More on the Netflix prize can be found at http://www.netflixprize.com/

**The impact of business plan competitions is questionable.**

*"University business plan contests don't produce winning companies. Yes, a number of companies have emerged from business plan bake-offs that have been moderate or small successes. But not a single home-run has emerged from this now-omnipresent practice."*

***Vivek Wadhwa* is an entrepreneur turned academic. He is a Visiting Scholar at UC-Berkeley, Senior Research Associate at Harvard Law School and Director of Research at the Center for Entrepreneurship and Research Commercialization at Duke University.**

*"I hate business plan competitions – they encourage students to write a "winning plan" rather than teaching them how to get out of the building and use locally available resources to start a company."*

***Steven Blank, Serial entrepreneur, teaching entrepreneurship to both undergraduate and graduate students at U.C. Berkeley, Stanford University and the Columbia University/Berkeley Joint Executive MBA program***

The team suggests focusing iMULAI on developing entrepreneurs to focus on identifiable problems or opportunities in Indonesia. An example is to have a specific competition to develop an SMS marketing campaign to educate and market agriculture inputs to farmers. Having large agribusinesses (both input providers and exporters) support this competition could help guarantee success. Indonesia is already one of biggest users of mobile ads in the world, so the business model already exists; the need would be to motivate these ad businesses to the rural areas, and maybe the publicity and funding could be part of this.

Another suggestion for iMULAI is to increase the number of sponsors of these events. Microsoft is a great partner, but there are other technology firms promoting their technology that should be happy to support iMULAI. For example, Research in Motion (RIM), maker of Blackberry phones, could be a great partner given the company's growth in Indonesia. Other possible partners could be larger IT professional and business associations, like MASTEL, Mobile Monday, Startup Lokal Meetup and Sparx Up, which will help get the word out and assist with logistical support.

# Appendix A: Contacts/Interviewees

## 1. MNOs

### Axis

Ben Soppitt
Head of Corporate Strategy & Business Development
Corporate Strategy Division
62-838-8013-700
Ben.soppitt@axisworld.co.id

Achmad Nusjirwan Sugondo
Sr. Manager, Strategy & Industry Analysis
Corporate Strategy Division
62-838-8000-241
Achmad.sugondo@axisworld.co.id

### Indosat

Indra Lestiadi
Division Head
Mobile Commerce
62-21-3000-3001
indra.lestiadi@indosat.com

Victor Pangalinan
Manager BSS & Project Support
0855-100-2223
victor.pangalinan@indosat.com

Marsuki
Supervisor Project Support
marsuki@indosat.com

Ichwansyah Putra
Product Development
Divisi Mobile Commerce
Office 62-21-3000-3001
Mobile 62-816-700-456
ichwansyah.putra@indosat.com

Alexander Rusli
Independent Commissioner
6221-3869-114
Cell: 6281-5988-5881
alexander.rusli@indosat.com

### Telkomsel

Reyhan
Head Office
Kantor Pusat/Head Office Mezzanine – 19th Floor

Alamat:
Wisma Mulia Mezzanine – 19th Floor
Jln Gatot Subroto No.42
Jakarta 12710 Indonesia
62-21-5240811
Cell: 62-811-910-116
reyhan@telkomsel.co.id

Rec S Babasa
DVP T-Cash Management
62-21-5240811
Cell: 62-811-991-9432
Ricaredo_s_babasa@telkomsei.co.id

Fajar Gumilar
Head of Technology Plan & Roadmap Group
62-21-524-0811 ext. 11018
fajar_gumilar@telkomsei.co.id

Jl. Budi Utomo
Timika, Papua

Safrudin
Head of services for Regional Branch Office in Timika

PT Telkomunikasi Indonesia, Tbk. (Telkom)
Jl. Belibis No. 8
Timika, Papua

Bambang A.V. Rogito
Account Manager
62 901 324000
Cell: 62-811-499595
rogito@telkom.co.id
rogito@telkom.net

Jankir, Customer Services Manager

## 2. Banks

**Bank Andara**

Plaza Bapindo, Citibank Tower, 28th Floor
Jl. Jendral Sudriman Kav 54-55
Jakarta 12190 Indonesia
62 21 526 0707
www.bankandara.co.id

Don Johnston
Business Development Director
62-21-526-0707

Don.johnston@bankadandara.co.id

Irianto Kusumadjaja
Operation & IT Director
Jl. WR Supratman No. 27X
Denpasar 80236, Indonesia
62 361 227 721-4, 225 206
Cell: (62) 812 875 2718
Irianto.kusumadjaja@bankandara.co.id

Numan R. Manaf
Task Force & Fee Based Business Manager
Cell: 62 812 20 10 874
Numan.manaf@bankandara.co.id

Paulus Wiranta
President Director
62-21-526-0707
Paulus.wiranta@bankandra.co.id

**Bank Bri**

Gedung BRI Lantal 10
Jl. Jend Sudirman Kav. 44-46
Jakarta Indonesia 10210
www.lvpbri.com

Razaq Manan Ahmad
Microfinance Specialist
62-21-575-1025
razaqmananhmad@gmail.com

Agus Rachmadi
Head of BRI Microfinance International Corporation
62-21-575-1029
agusrachmadi@gmail.com

**Bank Muamalat**

Agussalim
Account Manager
62-411-832-777
Cell: 62811-441-822
Agus.salim@muamalabank.com

Akbar Sulaiman
Account Manager
62-411-832777 Ext. 110
Cell: 62-813-4421-1311
Akbars_karib@yahoo.com

**Standard Chartered**

Micha Tampubolon

General Manager
SME Banking
Menara Standard Chartered, 8th Floor
Jl. Prof. DR. Satrio No. 164
Jakarta 12930 Indonesia
62-21-57 999 000 ext. 50085
Micha.Tampulbolon@sc.com

### 3. Agribusinesses

**Armajaro**

Ir. Lengkang Lengk
JL. Soekarno-Hatta Km12
Way Gubak
Panjang
Bandar Lampung
Indonesia 35244
Technical Advisor – Indonesia Operation
62-411511910
Cocoalgkang@yahoo.co.id

David TK Ngu
General Manager – Indonesia Operation
62-411511910
davidngu@indosat.net.id

Armajaro Buying Station (cocoa)
Pasennangi, Manager
Mobile, Sub-District
Polman District, West Sulawesi

**Bimandiri**

Sandredo
JL. Panorama no. 54 Haurpungkur
Lembang – Bandung 40391
022-278-7139-2789619
bimandiri@bdg.centrin.net.id

**Olam**

Andi Faik
Kompleks Plaza Pacific Blok B2/26
Jln Boulevard Barat, Kelepa Gading
Jakarta Utara 14240
62-411-511695-512366
Andi.faiq@e-olam.com

Sumanta Kumar De
General Manager – Cocoa Division
62-21-72780143
Cell: 62 – 811 – 465447
sumanta@olamnet.com

Saurabh Suri
Associate General Manager – Cocoa Division
62-411-511695
62-811-657450
Saurabh.suri@olamnet.com

PT Olam Buying Station (cocoa)
Pinrang (Sulawesi)

Eda
Buying Station Manager
Farmers in groups (all cocoa farmers), Sulawesi

Pinrang (at Olam Buying Station)

**Asosiasi Kopi Spesial Indonesia (Specialty Coffee Association)**

Ina. A. Murwani
Executive Director
62-21-571-3548
Cell: 62-818-865-346
Ina_murwanI@dai.com

Tuti H. Mochtar
Chairperson
62-21-571-3548
62-811-141-387
Tuti_mochtar@cbn.net.id

Wonomulyo (with Cocoa Alliance secretariat)

Marannu Farmers Group
Village of Pulliwa
Bulo Sub-District, Polewali Mandar (Polman)
West Sulawesi

**PT Cargill Indonesia**

Jl. Kima 9 Kav. L7B. DAYA
Makassar 90241, Indonesia
www.cargil.com

Thanh Nguyen
General Manager – Cocoa Division
62- 411-514-361
Cell: 61-081-141-1777
Thanh_nguyen@cargill.com

PT Sarimakmur Tunggalmandiri (coffee Exporter)
Michael Wongso 08126537879
Office: 061-8454291

Affan H. Siregar
Accounting Manager – Cocoa
62-411-514-361
affan_siregar@cargill.com

## 4. Government Agencies

**Bank Indonesia**
Jl. M. H. Thamrin NO. 2
Jakarta 10350
www.bi.go.id

Aribowo
Head of Bureau
62-21-3818765
aribowo@bi.go.id

Puji Atmoko
Executive Analyst
62-21-3818762
P_atmoko@bi.go.id

Farida Peranginangin
Executive Payment System Overseer
62-21-38117145
faridap@bi.go.id

Sukarelawati Permana
Analis Madya Senior
62-21-3501947
lela@bi.go.id

**BRTI**
DR Iwan Krisnadi
Commissioner
BRTI – Indonesia Telecommunication Regulatory Authority
Menara Ravindo 11th Floor,
Jl. Kebon Sirih Kav. 75
Jakarta
iwankrisnadi@yahoo.com
http://www.brti.or.id/

**Others**
Government of Polman (in Sulawesi)
Ravindo Tower 11th Flor
JL Kebon Sirih Kav, 75

Halam Basir
Head of Crop and Forestry Estate
Polman District, West Sulawesi

5. **Donors/ Donor Projects**

***AMARTA*** (implemented by DAI)
BRI II Building, 28th Floor, Suite 2806
Jl. Jend. Sudirman No. 44-46
571 3548
www.amarta.net

Bill Levine
Chief of Party
William_Levine@dai.com
Jakarta

Kornel Gartner
PADA Project Coordinator
Papua Agriculture Development Alliance (PADA)
Jln. Cendrawasih SP 2
Timika, Papua 99910 Indonesia
General office: 0901 321 591
(62-901) 321 565
Kornel_gartner@dai.com
www.papuaspecialtycoffes.com

Hasrun Hafid
AMARTA Regional Office, Makassar
Hasrun_Hafid@dai.com
Cell: 0811-469-677

Fernando Tinal
Papual Agriculture Development Alliance (PADA)
Program Administrator
Cell: 0812-40-11-2004
Fernando_tinal@dai.com
Fernando_tinal@hotmail.com

Syahrir
Amarta Team Training Manager
Makassar
Cell: 0811418 731

**DAI Consultant working on IFC consulting engagement**
Mary Miller Senior Principal Development Specialist
Economic Growth
7600 Wisconsin Ave., Suite 200
Bethesda, Maryland 20814 USA
Direct Line: +1 301 771-7822
E-mail: Mary_Miller@dai.com
www.dai.com

**The World Bank**

Natasha Beschorner
Senior ICT Policy Specialist
Indonesia Stock Exchange Building, Tower 2, 12th Floor
Jl. Jenderai Sudirman Kav. 52-53
Jakarta 12190 Indonesia
62-21-5299
nbeschorner@worldbank.org

**German Technical Cooperation**

Asok Malkarnekar
Promotion of Small Financial Institutions
Radius Prawiro Building, 2nd Fl.
Jl. M.H. Thamrin No. 2
Jakarta 10350 Indonesia
62-21-386-6384
ashok.malkarnekar@gtz.de

**International Finance Corporation**

Indonesia Stock Exchange Building
Tower 2, 9th Floor
Jl. Jenderai Sudirman Kav. 52-53
Jakarta 12190 Indonesia
62 -21-2994-8001

Tom Moyes
Program Manager
Access to Finance
Advisory Services in Indonesia
rmoyes@ifc.org

Donny Praseiya
Associate Operations Officer
Indonesia Stock Exchange Building
dpraseiya@ifc.org

Nyoman G. Satrya Wibawa
Associate Operations Officer
Cell: 62-817-077-1703
Nwibawa@ifc.org

## 6. ICT Businesses and ICT associations

**APJII**

Cyber Building 11th Floor
Jln. Kunningan Barat No. 8
Jakarta 12710 Indonesia

Sammy Pangerapan
Vice Chairman
62-21-5296-0634

waketum@apjii.or.id

Freddie Pinontoan
Head Dept. of Org & Membership
62-21-5296-0634
Kabid.org-member@apjii.or.id

Harijanto Pribadi
Head of Dept. of Internet Security
62-21-5296-0634
Cell: 62-856-675-08-427
Kabid.security@apjii.or.id

**Monitise**

Antony Morris
Business Development Director
852-2985-2539
Antony.morris@monitisegroup.com

**MV Commerce (Indonesia)**

Hendra Sutandinata, MSC, MBA
Executive Director
Sudirman Tower 16th Floor
Jl. Jend. Sudirman Kav. 60
Jakarta 12190 Indonesia
Cell: 62-816-191-0270
Hendra@MVCommerce.com

**NuMedia**

Andy Zain
SkyBee One Building, Level 3
Kebon Sinh Raya Kav. 63
Jakarta 10340 Indonesia
62-812-100-5855
Andy.zain.numedia.co.id

**VeeLabs**

Jl.Gelong Baru Tengah No.19
Tomang, Jakarta 11440

Novi Arisandy Tabrani
Sales Manager
62-21-569-444420-2
marketing@veelabs.com

Indriani Widyasari
eBusiness Consultant
62-21-569-44420
marketing@veelabs.com

**GreenLinks**

Hidayat Oemar
Managing Director
Graha Bumiputera, Suite 401 & 403
Jalan Asia Afrika 141-149
Bandung 40112, Indonesia
62-22-424-2024
Cell: 62-22-9119-5763
hidayat@mygreenlinks.net

**Mastel**

Graha MIK Lt.S Suite S04 A
Taman Perkantoran Kuningan
Jl. Setia Budi Selatan Kav. 16-17
Jakarta 12920

Teguh Anantawikrama
Deputy Secretary General
62-816-819-808
teguh_a@kadin-indonesia.or.id

Dr. Taufik Hascan
Executive Chairman
62-812-2020-505
Tfk252hsn@gmail.com

Eddy Thoyib
Executive Director
62-815-85-424-999
Eddy.thoyib@mastel.or.id

**Melsa**

Paskal Hyper Square C39-41
Paskal Hyper Square C39-
Jl. Pasirkaliki No. 25-27
Bandung 40181 Indonesia
6222-3000-2022

Iman Budiman
Chief Technical Officer
iman@melsa.net.id

Rully Budisatya
Chief Executive Officer
Cell: 628552139229
rully@melsa.net.id

M Irfan Fanani
62-81-2200-8748
irfan@melsa.net.id

**Other**

Eka Ginting
Independent Consultant
ginting@gmail.com
+62818773867

## 7. Universities and NGOs

**Institut Teknologi Bandung**

Jl. Tamansari 64
Bandung 40116,
Prof. Dr. Suhuno Harso Supangkat
Head
62-22-2501006
Cell: 0811219370
suhuno@itb.ac.id

Ir. Yudi Satria Gondokaryono, PhD.
Head of Electrical Engineering Program
Labtek VIII Building, 3rd Floor
Jl. Ganesa No. 10
Bandung 40132 Indonesia
62 -22-25000985
Cell: 62-8179242310
ygondokaryono@stei.itb.ac.id

Dr. Edwan Kardena
Director of Partnership and International Relations
62-22-4240250
kardena@pusat.itb.ac.id

Nomo Ruswanto
Assistant Director for Business Partnership
Jl. Ganesa No. 15
Bandung 40132 Indonesia
62-22-250-1006
Nomo@inkubator.itb.ac.id

**Other**

LPMAK (NGO receiving funding from Freeport)
Timika, Papua

Yohannes Arwakon (no card)

## 8. Other

**PT Freeport Indonesia**

PTFI Office Building
Kotak Pos 7100
Jl. Mandala Raya Selatan No. 1
Kuala Kencana, Mimika 99920

Papua, Indonesia

Arief Irwan Latif
VP, Social and Local Development
62-901-432223
Arief_Latif@fmi.com

**9. USAID**

**USAID/Jakarta**
American Embassy
Jl. Medan Merdeka Selatan 3-5
Jakarta 10110 Indonesia
www.usaid.gov/id

Robert M. Birkenes, Ph.D.
Indonesia Desk Officer
(Washington, DC ASIA/EAA, Room 4. 10-054)
202-712-4997
rbirkenes@usaid.gov

Richard Chen
Economic Growth Office
Cell: 0811 861 241
rchen@usaid.gov

Paul Deuster, Ph.D.
Senior Economic Policy Advisor
Economic Growth Office
62-21-3435-9345
pdeuster@usaid.gov

Scott Dobberstein
Deputy Director
62-21-3435-9302
sdobberstein@usaid.gov

Thomas L. Hutcheson, Ph.D.
Senior Economic Growth Advisor
62 21 3435 9314
Cell: 0811 970 2610
thutchenson@usaid.gov

J. Michael Nehrbass
Economic Growth Office, Director
62 21 3435 9418
mnehrbass@usaid.gov

Walter North
Mission Director
(62 21) 3435 9300

wnorth@usaid.gov

Preysilia (Lia)
Economic Growth Admin Assistant
6221-34359391
*Cell: 087880133 719*
preysilia@usaid.gov

Sanath K. Reddy, Ph.D.
Senior Economic Growth Advisor
62 21 3435 9442
Cell: 0811 133 7532
sreddy@usaid.gov

Brad Tucker
Program/Project Development Officer
62-21-3435-9413
Cell: 0811-141-721
btucker@usaid.gov

# Appendix B: Recommendations Regarding Access to Affordable Telecom Services in Papua

The ICT assessment team was asked to assess access to and affordability of telecommunications services in Papua, specifically for USAID's economic growth activities conducted in Papua (based in Timika) as part of the Papua Agriculture Development Alliance (PADA), an alliance between USAID (represented by the AMARTA Project), PT Freeport Indonesia, LPMAK (an NGO), and the Catholic Diocese of Timika.

PADA conducts work along the southern coast (fishing) as well as in 35 villages inland from Timika (coffee, cocoa, rice, swine, and chilies). PADA currently has six trading stations with two more in progress and one more planned (for a total of five for fishing; five inland).

This appendix summarizes the findings and recommendations of the ICT assessment team. It begins by addressing why anyone interested in Papua's development should be concerned about telecommunications services.

## *Why Worry about Telecommunications in Papua*

- We know (and research shows) access to telecommunications services is essential for economic growth. In fact, research shows that access to even cell phone service increases a country's economic growth.
- Telecommunications services are even more important in Papua given its poor infrastructure (few and poor roads).
- For agricultural development, luckily cell phone networks (not internet, let alone broadband internet) are almost always good enough for most agricultural uses. Still, internet access is ideal for written communications, orders, and financial management across distances.
- Broadband internet services are much more essential for health, education and government applications.
- The provincial government recognizes need for telecom services and has long-term plans for ~~P~~Papua Online" with e-government transactions and services.

## Access to Telecommunications Services in Papua in General

The World Bank conducted an assessment of telecommunications services in Papua in 2010, which provided our ICT Assessment Team with a valuable summary of conditions there.[30] In short, telecommunications services are scant and expensive with large areas of Papua still relying on the most expensive options for even basic voice services (i.e., satellite phones) or short-wave radios. Telecommunications-wise, Papua is years – even decades – behind even some of the poorest, land-locked countries in sub-Saharan Africa. It is certainly far beyond most of the rest of Indonesia.

- About half of population of Papua has access to basic telecom services, primarily cell phones. This population is in district capitals and kecamatan centers and along the coasts.

[30] See two internal World Bank reports, both 2010, *Challenges and Opportunities Delivering ICT Infrastructure in Papua and Papua Barat* and *Papua and West Papua Infrastructure Report, Telecommunications Summary*. Both report available for USAID use with permission of the World Bank. Contact USAID/Jakarta for a copy of Judy Payne jpayne@usaid.gov

- Mobile network operators are Telkomsel, Indosat and XL (Excelcomindo) with Telkomsel having by far the majority of subscribers (in 2008, 1 million versus a total of 120,000 across the other two MNOs).
- The main towns also have some fixed lines and some fixed-wireless services, equivalent to fixed lines but cheaper to deploy.
- Internet access is even more scarce and costly, using dial-up connections where fixed lines are available; cell phone networks in the few towns and areas served by 2.5G services and stand-alone VSATs elsewhere.
- Broadband Internet is extremely rare, mostly limited to Telkom services to Timika and Jayapura.
- Even in towns with internet access in internet cafes, prices are three to four times those in other parts of Indonesia. Despite this, such shared access points are reported to be crowded.
- Jayapura has some limited terrestrial fiber network – what most developed cities have to every household.
- The World Bank's report sums up Internet access in Papua as follows:

  *"Telkom's Internet bandwidth for the entire Papua and W. Papua Provinces was 30 megabits per second (Mbps) in mid-2008, equivalent to a typical residential bandwidth offering for three homes in Western Europe, Japan or Korea. … Typically the cost per bandwidth unit on high capacity fiber optic cable routes is 1/50th or lower than for a satellite connection. This reliance [by Papua] on satellite transmission limits capacity and speed of data transmission, and the quality of service."*

### *Hopes for Improvements*

- ***Palapa Ring***: There are plans for improving Papua's access to the national and international internet backbone (an undersea cable) but these have been delayed repeatedly and investors have dropped out.
- ***National Universal Service Obligation Program:*** The Government of Indonesia's Telecommunications Universal Service Fund (USO Fund) has recently awarded an order for some 2800 VSAT's to be placed in villages around Papua. The ICT assessment team was able to track down the villages where the USO will invest in access. Some of these districts (noted below) that PADA estimates its work in will be receiving USO cell phone access:

**Table 5: PADA Districts, With and Without Cell Phone Access**

| Expected PADA Districts with USO cell phone access | Expected PADA Districts with no USO cell phone access |
|---|---|
| Jila | Manasari |
| Agimuga | Otakwa |
| Pantai | Kokonao |
| Bomomani | Timika (Already has cell phone access) |
| Wamena | Lani Jaya |
| Jayawijaya | |
| Jita | |

### *PADA's Access to Telecommunications Services*

- Where PADA works (along the coast and inland), there is essentially no cell phone coverage beyond Timika.
- Most PADA trading stations rely on short-wave (SSB) radios or in one case, a satellite phone. There are three satellite "phone shops" (shared access to a satellite phone) in Kokonao, Jila and Aramsoki.
- ***Fishing activity access.*** Along the coast where the fishing trade is being developed, the three trading stations have two-way radios; the hub has access to cell phone service and has a PC. It develops its reports and sends them to the managing cooperative via the internet. None of the three boats has a two-way radio.
- The fishing trading station hub coordinates the pickups by the three fishing boats. PADA reports that no software or SMS application is needed to do this.
- The cooperative that manages the fishing work from Timika has a PC and internet access. It uses Excel templates for financial management and its records (kept down to the individual fisherman), and this is adequate. The cooperative is planning to open a micro finance institution soon as one more service for its members, building on the credit records of the fishermen.
- ***Inland where PADA is developing village trading stations*** and improving value chains for swine, rice, and some vegetables and bananas, there is no cell phone access. The villages rely on satellite phones or two-way radios when available. One of the inland trading stations has a stand-alone PC, and four have typewriters.
- The ***coffee cooperatives working with PADA*** have better telecom access. They have PCs with some internet access.
- The PADA team is using Global Position System (GPS) tools to map out points along the waterways it travels and paths and roads used in their work.
- PT Freeport is has funded a community radio station with a tower to enable the station to have a powerful signal to reach many inland villages. LPMAK is helping to run the station and has a consultant helping to set it up.

### *Potential PADA Uses of ICT to increase impact.*

- PADA would like 2-way radios for all three fishing boats to be able to keep track of them in bad weather or if they get delayed.
- PCs for all trading stations would be ideal
- PADA could take full advantage of the new community radio station if it could tap some experts on radio programming and production to ensure the radio programming is designed to motivate target listeners to listen and learn.
- Provide trading stations and any other appropriate farming groups with crank radios to listen to the community radio programming. Ideally these radios will have a solar charging option as well as a built-in MP3 player to store programs for later listening. (The ICT assessment team has already provided the PADA team with information on a source for such radios.)

## Appendix C: ICT to Manage Big Buyers' Supply Chains

This appendix provides information on how ICT might be used by a future USAID/Indonesia agriculture project to help large buyers or processors manage their supply chains in ways that provide benefits to smallholder farmers.[31] The ICT assessment team did not identify any specific demand for this use of ICT, but a future USAID project might do so.

Large buyers or processors can finance ICT-enabled applications to improve the efficiency of their supply chains. A USAID project should only consider facilitating such a use of ICT if it provided substantial benefits to smallholder farmers and, even then, it should do so in partnership with a large buyer. There have been cases for USAID projects to provide some contribution or level of effort to establish such systems.

**Why?** The use of ICT-enabled supply chain management applications can help smallholder farmers in a variety of ways, such as making it easier for large buyers or processors to reward smallholder farmers for on-time deliveries or quality products; to pay smallholder farmers faster; to meet end customer traceability requirements (which could lead to higher prices paid to smallholder farmers); and even to reduce spoilage thus reducing financial losses of smallholder farmers. The examples in the table below have led to all of these types of benefits for smallholder farmers.

### *Findings Related to the Use of ICT-enabled Supply Chain Management Systems*

Many lead agriculture firms elsewhere use ICT-enabled supply chain management systems. Coffee buyers are using global position system (GPS) to trace products back to specific locations. Cocoa buyers are also geo-locating farmers for sourcing purposes. In Rwanda, coffee collectives find using email useful to maintain communications with their key international buyers who buy from them as ~~-r~~elationship marketing," i.e. identifying the specific source of coffee (a specific cooperative) to appeal to customers.

In horticulture, lead buyers in some countries gather data on planned or actual harvests from collectors (those buying crops from smallholder farmers) to estimate production and inventory levels of vegetables, but are not demanding better, ICT-enabled software applications.

Large buyers elsewhere sometimes have found that ICT-enabled applications help them better manage traceability requirements, but the ICT Assessment Team did not identify any large buyer in Indonesia that expressed a strong demand for more enhanced ICT-enabled applications. The team did interview a few large buyers that faced significant paperwork requirements related to traceability (for cocoa and especially for coffee which sometimes has to be tracked to the cooperative level), but all of these requirements were being handled sufficiently using paper-based systems that are tied back to the geographic location. Cocoa certification systems do not require traceability back to the specific source (e.g. farm or cooperative), but simply require that certified cocoa be aggregated separately from non-certified cocoa. Hence, it is unlikely that ICT-enabled traceability systems will be needed for cocoa but may eventually be demanded for coffee.

[31] For further information on ICT enabled supply chain management applications, see USAID briefing paper*, ICT Applications for Distribution and Supply Chain Management in Sub-Saharan African Agriculture***,** December 2010 available from Judy Payne, jpayne@usaid.gov and which will soon be available via this website: http://www.microlinks.org/ev_en.php?ID=43539_201&ID2=DO_TOPIC

The ICT team identified two pilot projects focused on collecting data directly from the farmers. The team interviewed one such ICT-enabled supply chain system being piloted with rice, potatoes, and corn by the Ministry of Society and local governments in Papua.[32] The system relies on lead farmers to enter data on behalf of other farmers. The scalable business model for this application is unclear, but the software platform for this service could be adapted to another supply chain. The ICT team identified a second supply chain application now under development, although details were few, there is a partnership between an input provider and AXIS, an MNO. The application reminds farmers when to apply agriculture inputs to their farms.

### B. Learning from Elsewhere: Use of ICT-enabled Supply Chain Management Systems[33]

The following table briefly describes three supply chain related systems for which a USAID project provided assistance because it provided benefits to smallholder farmers. Many large buyers or processors have their own privately-funded systems to manage their supply chains (e.g., managing logistics or order fulfillment), but these systems usually do not directly benefit a USAID project's target beneficiaries so projects do not provide assistance to them.

**Table 6: Supply Chain Related Systems With USAID Assistance**

| Example | Lessons Learned, Best Practices |
|---|---|
| System used by Dunavant Cotton (Zambia) | Dunavant is a large cotton buyer, buying from smallholder farmers in Zambia. USAID's PROFIT Project facilitated the development of such a system (funded by Dunavant) because it enabled Dunavant to reward farmers for better quality crops and to pay farmers faster. Dunavant benefited as well because fast payments reduced ~~"~~side selling" by farmers, and it was able to manage its thousands of suppliers better, allowing them to see which farmers were better suppliers and creating an incentive program for such farmers. |
| System used by pineapple growers and exporters (Ghana) | USAID/Ghana's TIPCEE Project facilitated the use of bar coding for pallets of pineapples at field packing stations to increase the speed of transport of the pallets through European ports, hence reducing spoilage and increasing income for smallholder farmers. Bar coded pallets can be identified and moved faster in busy European ports in comparison to pallets with destinations labeled by paper or chalk. Bar coded information was transported to the export location at the port via a ~~"~~data stick" carried in the pocket of the truck driver, then uploaded into the automated logistics system. This was a simpler approach than setting up a more expensive electronic delivery approach. |
| FreshConnect (India) | This suite of mobile applications was developed by an Indian IT company, Infosys, in partnership with USAID/India's GMED Project. It allows supply chain participants to monitor and control back-end and front-end supply chain functions such as production planning and traceability. Several rounds of pilots of the software have taken place using high-end phones, and Infosys is modifying its original release to become available on low-end phones to suit commercial rollouts.[34] Smallholder farmers benefit because they are paid for quality, and farmer cooperatives can receive information on orders to fulfill across many farmers. Buyers benefit because they can more tightly manage their |

[32] See reference in Appendix E for the IFC's 2010 report, *Mapping and Preliminary Mapping of ICT Applications Supporting Agriculture Development, an IFC sponsored study in Uganda, India and Indonesia*, by Krish Kumar, pages 35-37.

[33] For more information on this topic, see http://www.microlinks.org/ev_en.php?ID=46725_201&ID2=DO_TOPIC

[34] McCarthy, Steve, et al, "New ICT Solutions to Age-Old Problems: Case of the IGP India Project," (2009) and Interviews with Krish Kumar, Senior Technical Advisor for ICT with ACDI/VOCA, Fall 2010.

| | |
|---|---|
| | logistics chain to reduce spoilage and meet demand. |

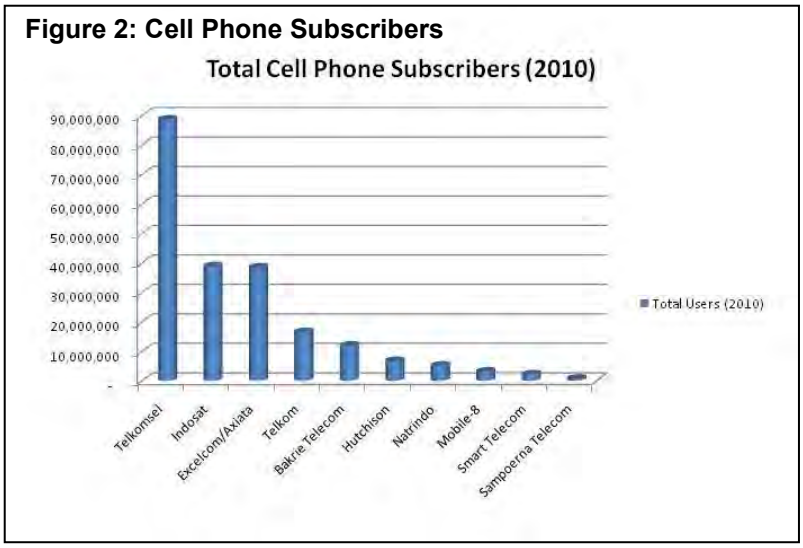
# Appendix D: Access to Telecommunications Services in Indonesia

For the purposes of the recommendations made in this research report, cell phone access is the primary focus. For most of Indonesia, cell phone access is adequate enough for the technologies recommended except for Papua, which has very limited cell phone access. The World Bank is currently working with Badan Regulasi Telekomunikasi Indonesia (BRTI), the telecom regulator, on broadening the use of the Universal Service Obligation (USO). So the ICT assessment team recommends that USAID/Indonesia **NOT** work on the telecom environment to improve access to affordable telecommunications services in Indonesia. That said, below is short summary on telecom access. There are recommendations specifically for Papua and the PADA project on utilizing ICT services to accomplish its goal in Appendix B.

## *Telecom Access Analysis Summary*

This section will just summarize the telecom sector because there is already a great deal of good analysis on this topic by organizations such as The World Bank, International Telecommunication Union (ITU) and LIRNEasia an Asian ICT policy think tank.[35] According to the National Social and Economic Survey, 99 percent of the sub-districts are covered by cell phone coverage. This number is a bit misleading, and it should be noted there are areas with very limited cell phone access like Papua, which only has 173 of Indonesia's 5,300 sub-districts. Telecom access is much more limited in Eastern Indonesia, especially in Papua where, outside the major cities, expensive VSAT is the only two-way communication option. There are 10 Mobile Network Operators (MNOs) in Indonesia that service 125 million mobile users with 213 million subscriptions (some users have multiple subscriptions). The breakdown among the MNOs is in Figure 2; Telkomsel has the biggest market share and broadest access.

**Figure 2: Cell Phone Subscribers**




There are 37.5 million fixed lines and 40 million internet users; 60 percent are mobile internet users, including 5 million broadband users.[36] According to interviews with Asosiasi Penyelenenggara Jasa Internet Indonesia (APJII), which is the association for the ISPs, there are 300 ISPs that service 20,000 warnets,[37] or internet centers. Mobile phone subscribers and

[35] Two good reports to look at to get an understanding of telecom environment and ICT access are the following from LIRNEasia http://www.lirneasia.net/wp-content/uploads/2009/07/TRE_Indonesia_2009Mar18.pdf and from the ITU http://www.itu.int/publ/D-IND-RPM.AP-2009/en also you can take a look at the World Bank ICT At-a-Glance http://devdata.worldbank.org/ict/idn_ict.pdf

[36] Most of the telecom data is coming from Survei Sosial Ekonomi Nasional (SUSENAS - National Social and Economic Survey) 2008

[37] Conversations with Warnet Assocation

internet usage by province is in the following table.[38].

**Table 7: Telecom Usage by Province**

| Province | Internet | # Mobile Subscribers | # Mobile Numbers |
|---|---|---|---|
| | (millions) | (millions) | (millions) |
| **NAD** | 0.812 | 2.538 | 3.952 |
| **Sumatera Utara** | 0.716 | 2.238 | 3.485 |
| **Sumatera Barat** | 1.220 | 3.813 | 5.938 |
| **Riau** | 1.192 | 3.725 | 5.802 |
| **Jambi** | 0.776 | 2.425 | 3.777 |
| **Sumatera Selatan** | 0.796 | 2.488 | 3.875 |
| **Bengkulu** | 1.036 | 3.238 | 5.043 |
| **Lampung** | 0.548 | 1.713 | 2.667 |
| **Kep. Bangka Belitung** | 0.812 | 2.538 | 3.952 |
| **Kep. Riau** | 3.540 | 11.063 | 17.231 |
| **DKI Jakarta** | 5.332 | 16.663 | 25.954 |
| **Jawa Barat** | 1.632 | 5.100 | 7.944 |
| **Jawa Tengah** | 1.040 | 3.250 | 5.062 |
| **DIY** | 4.576 | 14.300 | 22.274 |
| **Jawa Timur** | 1.100 | 3.438 | 5.354 |
| **Banten** | 1.776 | 5.550 | 8.645 |
| **Bali** | 1.696 | 5.300 | 8.255 |
| **NTB** | 0.556 | 1.738 | 2.706 |
| **NTT** | 0.388 | 1.213 | 1.889 |
| **Kalimantan Barat** | 0.696 | 2.175 | 3.388 |
| **Kalimantan Tengah** | 0.336 | 1.050 | 1.635 |
| **Kalimantan Selatan** | 0.628 | 1.963 | 3.057 |
| **Kalimantan Timur** | 2.260 | 7.063 | 11.001 |
| **Sulawesi Utara** | 1.068 | 3.338 | 5.198 |
| **Sulawesi Tengah** | 0.500 | 1.563 | 2.434 |
| **Sulawesi Selatan** | 0.908 | 2.838 | 4.420 |
| **Sulawesi Tenggara** | 0.688 | 2.150 | 3.349 |
| **Gorontalo** | 0.628 | 1.963 | 3.057 |
| **Sulawesi Barat** | 0.312 | 0.975 | 1.519 |
| **Maluku** | 0.528 | 1.650 | 2.570 |
| **Maluku Utara** | 0.876 | 2.738 | 4.264 |
| **Irian Jaya Barat** | 0.388 | 1.213 | 1.889 |

[38] This data is an extrapolation from results of SUSENAS 2008, which listed percentages of Indonesian Telecom access by provinces. Eka Gintang extrapolates this against the total number of mobile subscribers and the total number of mobile numbers of the top 5 mobile operators (Telkomsel, Indosat, XL, Telkom Flexi, and Esia).

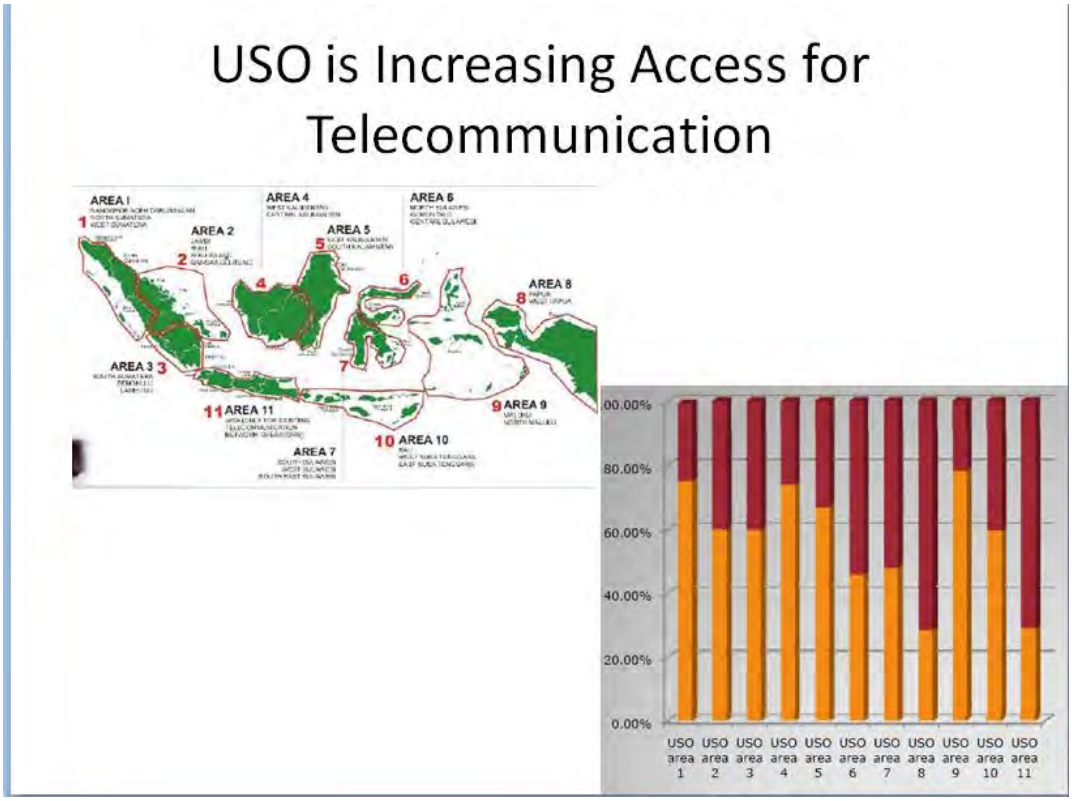
| | | | |
|---|---|---|---|
| **Papua** | 0.496 | 1.550 | 2.414 |

### *Universal Service Obligation (USO) summary*

A Universal Service Fund is used around the world by governments to incentivize MNOs and telecom operators to expand their telecom network into the rural areas where the financial returns are not worth the investment. Indonesia is implementing a Universal Service Fund through an instrument called Universal Service Obligation (USO), which is a .75 percent levy on telecom revenue which has been put into a fund that will support adding cell phone and internet access to villages in rural areas. The USO is governed by the Telecom Law 36/99. Part of the USO funding has been recently utilized in that two firms were awarded by competition to increase both cell phone access and internet access. Telkomsel was awarded the USO contract for Western Indonesia and ICON + has won the contract for Eastern Indonesia.

Figure 3 below shows a map of the country and how it is geographically divided into 11 USO areas, while the bar graph shows the villages without cell phone coverage and what percentage of them has or will receive cell phone access once the USO is implemented. The assessment team met with Telkomsel, and they confirmed they have implemented the network coverage to USO areas in Western Indonesia is complete. The team did not meet with ICON +, so the status of implementation in Eastern Indonesia is unknown. The team was also disappointed to hear about ICON +'s plans to implement expensive VSAT in Papua instead of trying to extend the current cell network.

**Figure 3: USO is Increasing Access for Telecommunication**



The future of the USO fund is uncertain; BRTI is attempting to increase the levy from .75 percent to 1.25 percent, which the MNOs are against. BRTI would like to transform the USO fund to something called an ICT fund, and they are being advised by the World Bank on this. The ICT Fund as planned currently would have a much broader mandate, including supporting the Palapa ring. The Palapa Ring, is a planned initiative to develop a much-needed telecommunications undersea cable to connect Eastern Indonesia to domestic and international telecom networks. There were seven interested telecom providers who signed the original MOU, but only Telkomsel is willing to invest into implementation, which is currently not moving forward. Therefore, utilizing the USO or ICT fund for this initiative would have a big impact of access of telecom to the people in Eastern Indonesia.

## Appendix E: Bibliography


Adams, W Dale. "The Bank Rakyat Indonesia Case." International Workshop on MSME Finance. Beijing, 2005.

AdMob. "AdMob Mobile Metrics: Metrics Highlights." 2010.

Aguiar, Marcos, et al. "The Internet's New Billion: Digitial Consumers in Brazil, Russia, India, China and Indonesia." 2010.

AMARTA. "AGRIBUSINESS MARKET AND SUPPORT ACTIVITY." 2010.

—. "AGRIBUSINESS MARKET AND SUPPORT ACTIVITY ." Helping Indonesia to Grow. 2010.

—. "AMARTA Interventions for Improving Competitiveness of Horticultural Value Chains: Vegetables in West Java." Bogor, 2008.

—. "AMARTA VCD INFORMATION TRANSMITTED THROUGH CABLE TV." USAID: Success Story. <www.usaid.gov>.

—. "DAILY BOOK KEEPING PROOIVDES NEW INFORMATION FOR FARMERS." USAID: Success Story. <www.usaid.gov>.

—. "ENTHUSIASM AMARTA, OLAM, AND COCOA FARMERS: A PROFITABLE PARTNERSHIP." USAID: Success Story. <www.usaid.gov>.

—. "ENTHUSIASTIC WORKING GROUPS: AN EFFECTIVE WAY TO STIMULATE TRAINING ADOPTION AND MOTIVATE FARMERS." USAID: Success Story. <www.usaid.gov>.

—. "HARD WORK AND NEW SKILLS RESULT IN IMPROVED COCOA PRODUCTION." USAID Success Story. <www.usaid.gov>.

—. "IMPROVING MARKET LINKAGES FOR BARANGAN BANANA GROWERS." USAID: Success Story. <www.usaid.gov>.

—. "INCREASING INCOME THROUGH COLLECTIVE MARKETING TO BUYING." USAID: Success Story. <www.usaid.gov>.

—. "TWENTY – FOUR MEMBERS OF THE INDONESIAN COFFEE INDUSTRY RECIEVED THE WORLD'S HIGHEST CERTIFICATION FOR QUALITY TESTING." USAID: Success Story. <www.usaid.gov>.

AusTrade. "Quick reference guide for ICT in Indonesia." 2010.

Badcock, Simon, Brian Matlick and Bako John Baon. "A Value Chain Assessment of the Coca Sector in Indonesia." January 2007. USAID. <www.usaid.gov>.

Bakrie, Anindya. "Securing Benefits of Broadband Economy." CONNECTIING THE NEXT BILLION Conference. Beacon & Mastel, 2010.

Barton, James. ~~"B~~BC English Lessons a Hit with Bangladeshi Mobile Users." Developing Telecoms. 04 March 2010. <http://www.developingtelecoms.com/bbc-english-lessons-a-hit-

with-bangladeshi-mobile-users.html>.

Bennett, Richard. "Going Mobile: Technology and Policy Issues in the Mobile Internet." Information Technology and Innovation Foundation, 2010.

Bosma, Niels and Jonathan Levie. ―2009 Global Report.‖ Global Entrepreneurship Monitor.

Cellular News. "Indonesia Leads Southeast Asia in 3G CDMA Subscriber Growth." 2008. ITU Telecommunication/ICT Statistics. <http://www.itu.int/ITU-D/ict/newslog/Indonesia+Leads+Southeast+Asia+...>.

Christopolos, Ian. 2010. Food and Agriculture Organization of the United Nations. Danish Institute for International Studies. <http://www.fao.org/docrep/012/i1444e/i1444e00.pdf>.

DDS. "Number of Branch Post Office, Supplementary and Auxiliary Post Office." 2008. <http://dds.bps.go.id/eng/tab_sub/print.php?id_subyek=02>.

Directorate General of Posts and Telecommunications of Ministry of Communications. "Restructuring the Telecommunications in Indonesia." n.d.

Goswami, Divakar. "DOI Applied to Indonesia: Assessing ICT Policy & Regulatory Environment." Digital Opportunity Forum. Seoul, 2006.

Gozali, Riyanto. "INDONESIA Becomes ICT Software Player." Panel Discussion for Engage Indonesia 2006. The Indonesia Telematics Software Association, 2006.

Growth, Enabling Affordable Broadband for Inclusive. "Enabling Affordable Broadband for Inclusive Growth." Connecting the Next Billion. Jakarta: ACMFI, 2010.

Harga, Statistik. "Data Strategis BPS." n.d.

Heeks, Richard and Abi Jagun. "m-Development: Current Issues and Research Priorities." 2007.

How to Make Indonesia's WajanBolic or PanciBolic (USB). 2009. <http://www.instructables.com/id/How-to-Make-Indonesias-WajanBolic-o...>.

―ICT Applications for Distribution and Supply Chain Management in Sub-Saharan African Agriculture.‖ USAID Breifing Paper. December 2010. http://www.microlinks.org/ev_en.php?ID=46725_201&ID2=DO_TOPIC

IFC. "Mobile Banking in Indonesia: Assessing the Market Potential for Mobile Technology to Extend Banking to the Unbanked and Underbanked." 2010. Internation Finance Corporation. <http://www.ifc.org/ifcext/eastasia.nsf/AttachmentsByTitle/Mobile_banking_report/$FILE/Mobile+Banking+Final+Report.pdf>.

"Indonesia ICT Assessment Workplan 1017." 2010.

"Indonesia Information Technology Index."

Indonesia, Demographic Institute: Faculty of Economics - University of. Determining the Impact of Information and Communication Technology (ICT) on Decent Work in Indonesia. Jakarta, 2004.

Intergrating ICT into Value Chain Development, Briefing Paper. 2009.

International Telecommunication Union. "Information Society Statistical Profiles 2009: Asia and Pacific." 2009.

Internet, Science Technology. Palapa Ring Finish 2009. 2008. <http://www.antaranews.com/view/?i=1216305386&c=TEK&s=>.

Islam, Jakirul Mohammad. "A Booming Telecom Business: Economic Infrastructure." Pacific Bangladesh Telecom Live. Bangladesh, n.d.

Kearney, A.T. "Offshoring for Long Term Advantage." 2007.

Koesmarihati. "INDONESIA'S RECENT REGULATORY AND POLICY DEVELOPMENTS." Group Meeting – Plenary Session. Lima: APEC Telecommunications and Working, 2008.

Krisnadi, Iwan. "Mobile applications in Asia and the Pacific: Indonesia Case." Economic and Social Commission for Asia and the Pacific Committee on Information and Communications Technology. 2010.

Kumar, Krish. Interviews with Krish Kumar, Senior Technical Advisor for ICT with ACDI/VOCA ACDI/VOCA, Fall 2010.

—. "Mapping and Preliminary Mapping of ICT Applications Supporting Agriculture Development, an IFC sponsored study in Uganda, India and Indonesia." IFC (2010): 35-37.

Kuppusamy, Mudiarasan, Mosayeb Pahlavani and Salman Ali Saleh. "Fostering ICT Development for Growth: Measuring the Payoffs for Australia and the Asean-5 Countries." American Journal of Applied Sciences 2008: 1676-1685.

Kuswadi, Son. "Policy and Development Strategy of National Education." Ministry of National Education, 2010.

LirneAsia. "Mobile Enchmarks." 2010.

Magrath, Brad. "Mobile Transactions Zambia Limited." Finmark's Branchless Banking Forum. 2008.

McCarthy, Steve. "New ICT Solutions to Age-Old Problems: Case of the IGP India Project." 2009.

Mehrotra, Udit. "Connecting the Next Billion: Sustainably, Profitably." Vihaan Networks Limited, 2010.

Meijer, Erik. "Connecting the Next Billion." Jakarta: Esia, 2010.

Mengko, Richard. "Connecting the Next Billion: Digital Local Content to Promote Economic & Social Development." Jakarta, 2010.

Moon, Charles. "Connecting and Engaging With the Next Billion." Informa Telecoms & Media. n.d.

Mudiardjo, Rapin. ".id Indonesia." Digital Review of Asia Pacific 2009–2010 (2009).

Neven, David and Ahmad Suleiman. "A Rapid Assessment on the Nature of Fresh Food Supply Chains to Supermarkets in Indonesia." January 2007. USAID. <www.usaid.gov>.

NOKIA. "How Social Are You: Nokia C3 & X5 Campaign Study." 2010.

O'Brien, Kevin. "Nokia builds growth ana less flashy path." Associated Press (n.d.).

Oliver, Rachel. "Asia Pacific Digital Marketing Yearbook 2009." (2009).

Ottaway, Anne. "A Rapid Assessment of the Specialty Coffee Value Chain in Indonesia." January 2007. USAID. <www.usaid.gov>.

Payne, Judy, Bruce Shulte, Shaun Ferris, Andrew Sergeant, and Mark Davies. –Designing Scalable and Sustainable Market Information Services for Grain Markets in Malawi." FACET Webinar. June 17, 2010. USAID. http://www.microlinks.org/ev_en.php?ID=44931_201&ID2=DO_TOPIC

Payne, Judy, "ICT Review of USAID/SENADA Project." For USAID/Indonesia, USAID 2007.

Payne, Judy and Josh Woodard. Using ICT to Enhance Farm Extension Services in Africa. USAID/AED. November 2010.

Payne, Judy, Lisa Kearns and Hannah Schiff. Integrating ICT into VC Development Briefing Paper. February 2009. USAID; ACDI/VOCA. <http://www.microlinks.org/ev.php?ID=35186_201&ID2=DO_TOPIC>.

Payne, Judy and Steve McCarthy. African Agriculture and ICT Overview . November 2010 . USAID, ACDI/VOCA . <http://www.microlinks.org/ev_en.php?ID=46494_201&ID2=DO_TOPIC>.

Prasad, Rohit. "Small is Beautiful: How Do You Make It Happen?" Connecting the Next Billion. Jakarta: Management Development Institute, Gurgaon, 2010.

Rees, van Jan. "Study of Indonesia Papua Telecommunication Infrastructure." 2009.

—. "Study of Recommended BroadBand Strategy in Indonesia." 2010.

Riang, Kahlung. "Indonesia: Celluar Services." (2010).

Riang, Kalung. "Indonesia: Broadband." (2010).

Rosenburg, Jim. CGAP: Advancing Financial Success for the World's Poor. 5 January 2009. <http://technology.cgap.org/category/geography/east-asia-pacific/china/>.

Rynecki, Steve. "GLOBAL READY INDONESIA: IMPLEMENTING A PILOT 3G WIRELESS BROADBAND TECHNOLOGY TRAINING AND JOB CREATION PROJECT IN INDONESIA." 2010.

Samarajiva, Rohan. "Internet for the next billion: The role of mobiles." Connecting the Next Billion. Jakarta: LirneAsia, 2010.

Santosa, Setyanto Dr. "Welcoming Address." Connecting Next Bi llion. 2010.

Savageau, John. Papau Struggles to Level the Internet Playing Field. 2010. <http://john-

savageau.com/2010/11/17/papau-struggles-to-level-the-interne...>.

Seacoop. "ICT policies, programmes and research." ASEAN, 2010.

SEA-EU-NET. R&D Country Profile Indonesia. <http://www.sea-eu.net/info/4/indonesia.html>.

Sirasoontorn, Puree. "Economic Analysis of Business Model for Delivering Mobile Value-Added Services in Thailand." 2010.

StarScriber. "Offering the next generation of –Please Call Me" Services." n.d.

Suhaimi, Hasnul. "Connecting the Next Billion." Axiata, n.d.

Sullivan, Gregory and Kusuma Diwyanto. "A Value Chain Assessment of the Livestock Sector in Indonesia." February 2007. USAID. <www.usaid.gov>.

Süßspeck, Sascha. "Mobile Money in Emerging Markets." Connecting the Next Billion. Jakarta: Ovum, 2010.

The Banking with the Poor Network in collaboration with the SEEP Network. "Microfinance Industry Report: Indonesia." 2009. The Microfinance Gateway. <http://www.microfinancegateway.org/gm/document-1.9.36444/MF_Industry_Report_Indonesia.pdf>.

The Economist. "Digital Economy Rankings 2010: Beyond E-Readiness." 2010.

The FINANCIAL. "IFC Helps Extend Reach of Financial Services through." The Financial (2010): 1-3.

"The Global Information Technology Report: Indonesia ." 2010.

Trujillo, Omar. "Connecting the Next Billion (s)." Connecting the next billion. Jakarta: O3b Networks, 2010.

Tuchrello, William. Integrating Information Mediums: the Digital Divide Environment of Indonesian Studies Access to Information. Jakarta: Library of Congress, 2010.

USAID. "AFRICAN AGRICULTURE AND ICT: AN OVERVIEW." 2010.

—. "Challenges and Opportunities Delivering ICT Infrastructure in Papua and Papua Barat."

—. "ESTABLISHMENT OF REGIONAL ALLIANCE TO CREATE AN ENABLING ENVIRONMENT FOR IMPROVING AGRIBUSINESS COMPETITIVENESS: LESSONS LEARNED." Center for Agricultural Technology Assessment. Bogor, 2008.

—. "ICT to Enhance Farm Extension Services in Africa." 2010.

—. "ICT TO ENHANCE WAREHOUSE RECEIPT SYSTEMS AND COMMODITY EXCHANGES IN AFRICA." 2010.

—. "Papua and West Papua Infrastructure Report."

—. "Using ICT to Provide Agriculture Market Price Information in Africa." 2010.

–Using ICT to Provide Agriculture Market Price Information in Africa." USAID Briefing Paper.

November 2010. http://www.microlinks.org/ev_en.php?ID=46498_201&ID2=DO_TOPIC

"Using Mobile Money, Mobile Money to Enhance Agriculture in Africa." http://www.microlinks.org/ev_en.php?ID=43539_201&ID2=DO_TOPIC. Comp. USAID, jpayne@usaid.gov Judy Payne.

Walker, Sophie. ~~I~~CT to Enhance Warehouse Receipt Systems and Commodity Exchanges in Africa." USAID Briefing Paper. November 2010. http://www.microlinks.org/ev_en.php?ID=46495_201&ID2=DO_TOPIC

Wishart, Neville. "Micro-Payment System and their Application to Mobile Networks." 2009.

World Bank. "ICT At-a-Glance: Indonesia." 2008.

—. "Improving Educational Quality through Interactive Radio Instruction - A Toolkit for Policymakers and Planners." Africa Region Human Development Working Papers Series (2005): 1-140.

—. "Challenges and Opportunities Delivering ICT Infrastructure in Papua and Papua Barat." Internal. World Bank, 2010. jpayne@usaid.gov Judy Payne.

—. "West Papua Infrastructure Report, Telecommunications Summary." Internal. 2010. jpayne@usaid.gov Judy Payne.

**U.S. Agency for International Development**

1300 Pennsylvania Avenue, NW

Washington, DC 20523

Tel: (202) 712-0000

Fax: (202) 216-3524

**www.usaid.gov**